

COMPLETELY NEW 3rd EDITION

\$10⁹⁵

HOME GUNSMITHING DIGEST

By Tommy Bish

Repair, Restoration, Remodeling for every
gun owner. Metal: Plating, Inlaying, Soldering
Wood: Gluing, Coloring, Filling, Finishing.
Tools: Choosing, Sharpening, Care.



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Chapter 1

TOOLS FOR THE BEGINNER

*The Assortment Of Equipment Is Endless, But
Here's A Start For The Beginning Gunsmith*

MANY TIMES over the years, I have been asked, "What tools would you recommend as a basic group for doing gun work in my home?"

This question, in turn, brings a host of other questions, including what type of gun work the individual will be doing? There are almost limitless phases to gun work. Some may specialize in stock work, building and finishing stocks for new barreled actions. Others will prefer to work on nothing but gun actions, while some will want to devote their efforts to creating super-accurate barrels. Each of these approaches requires a great variety of specialized tools with which to get the job done right.

Then, too, there might well be some who prefer working on older guns in the field of restoration. This can be a highly lucrative field, as there is great demand for those who are adept at this type of work and able to do it correctly.

But let's assume that one is interested only in general gun repair or building a gun kit now and then, but is dubious as to where to start in acquiring the necessary tools. No

true craftsman in any mechanical trade ever has enough specialized tools to fulfill his needs. He is always adding to his assortment. Be it files, chisels, precision instruments or even screwdrivers, more are always needed.

However, for the true beginner there is no sense in starting at the bottom of the pile as far as tools are concerned. When tools are purchased, even for a hobby, buy the best. Purchasing cheap, poor-quality instruments usually is the same as throwing away your money. The best tools should last a lifetime with proper care, while cheap inferiors can only lead to frustration and, as a rule, poor craftsmanship. Pride in the quality of your tools equates to pride in the quality of the work you do with them.

It certainly is not necessary to have an elaborately equipped shop, complete with the latest and best in lathes, milling machines, drill presses, ad infinitum, in order to turn out beautiful work. Some of the most beautiful rifles, pistols, fowling pieces, even cannons were turned out well over a century ago by craftsmen who used primitive tools. But these craftsmen knew how to use the tools, then available, properly.

The Basic Gunsmithing Kit put together by Bob Brownell includes a variety of tools that will prove invaluable to the journeyman gunsmith or the just beginning novice.





Those who want to work with firearms will need a variety of hammers. Illustrated here are ballpeen hammers, as well as nylon, brass and rawhide-headed mallets. All of these will see much use in any gunshop.

One firearm that illustrates this point would be the beautiful and graceful Kentucky-type rifle, considered as one of the most handsome and beautiful arms ever made. The conditions under which these highly accurate rifles were made were primitive at best. There were no precision lathes or milling machines in the shop of the frontier gunsmith. Those labor-saving devices hadn't been invented yet. Thus, the early craftsman relied upon handtools—usually of his own manufacture. Precision instruments, such as dial calipers and micrometers also were still unknown. A handmade set of dividers, inside and outside calipers were about the extent of his precision instruments. These, and sharp eyes, were all he needed.

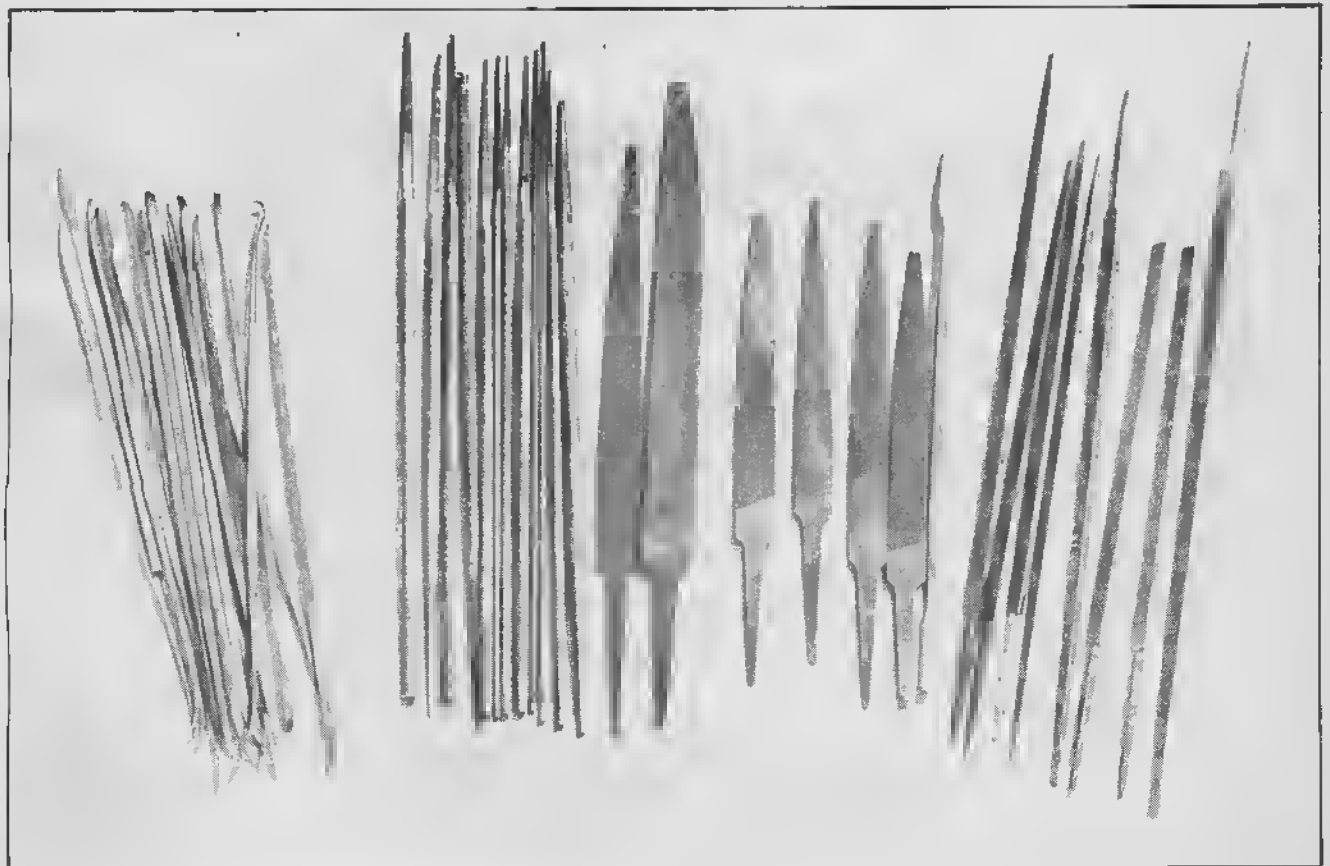
In the present age, precision tools are commonplace, but not cheap! One might have unlimited funds with which to buy the finest machine tools, but ability to buy certainly is no indicator of an individual's ability to use such equipment to produce outstanding work. The mark of a crafts-

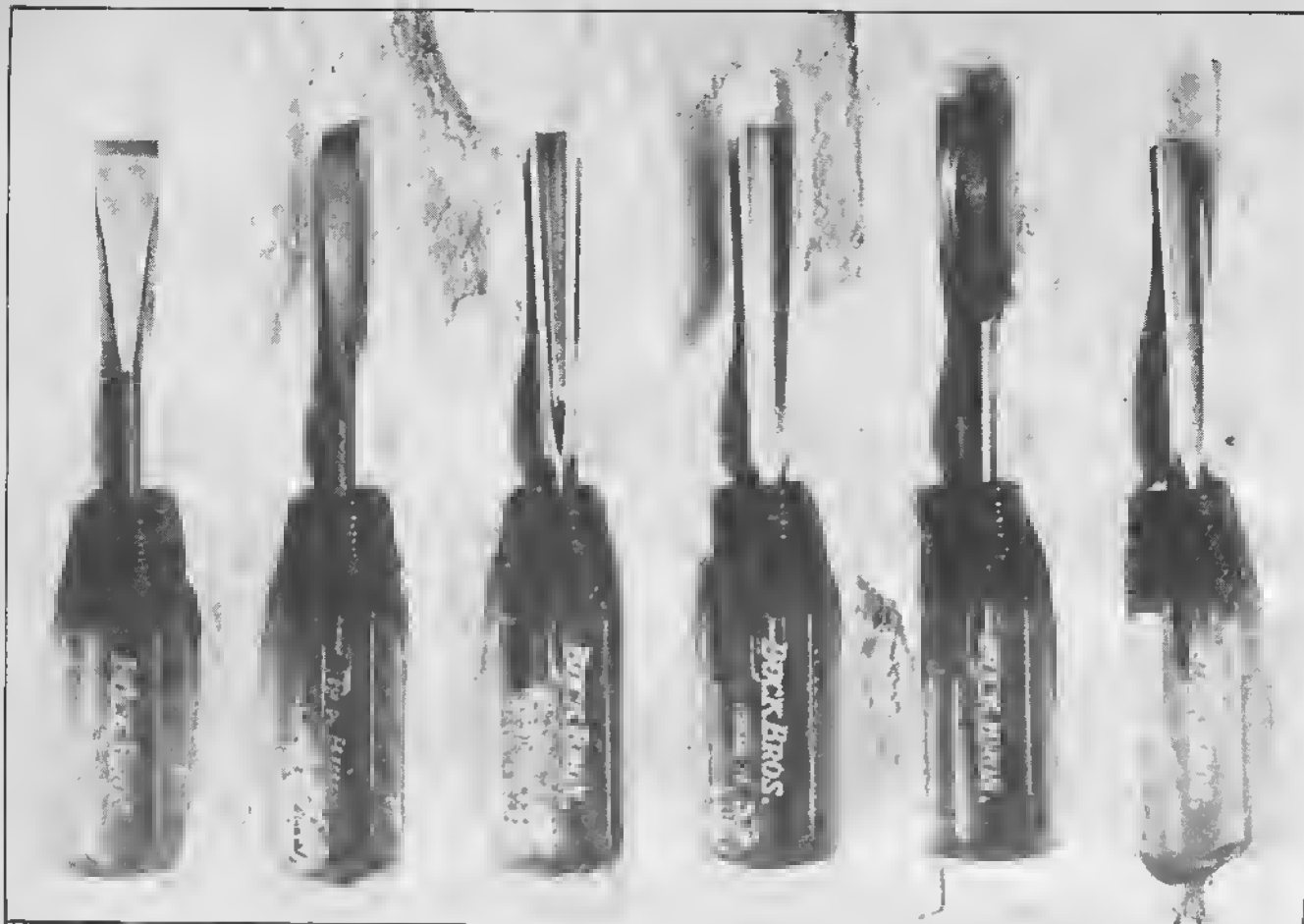
man is best illustrated by the quality and the beauty of the work he turns out.

Taking these thoughts into consideration, let's get back to that beginning gun worker who wants to get off on the right foot as far as his tools are concerned.

Brownell's of Montezuma, Iowa, the largest and best known gunsmith supply house in the nation, has what Bob Brownell calls the Basic Gunsmithing Kit. But before we go into the details of this kit, let me tell you a little about Bob and Frank Brownell. The father and son who operate this company both are well versed in the needs of the working, professional gunsmith. They know the field inside out and their reputation is the highest. I have dealt with the Brownells for well over forty years and have come to be convinced that they have the best interests of the working guncraftsman at heart. Every tool they offer their clients is the finest, bench-proven instrument available. I feel that this also applies to every other product included in their

Over a period of time, the gunsmith or repair hobbyist will need countless files for the many and varied jobs that occur in gunsmithing. Although more expensive, top-of-the-line files will pay for themselves through use.





A good set of chisels is a must on the gunsmith's bench. Buck Brothers produces a quality chisel set at a price that most of us can afford. Almost every type of chisel necessary for general gun work is included in the set.

thick catalog devoted to the gunsmithing trade.

Brownell's Basic Gunsmithing Kit is just that: a basic kit. But it will get the newcomer off to gun work on the right foot toolwise. Each tool in this kit was hand picked by the Brownells to meet the basic needs of the beginner. All are professional in quality, the same as those tools used by the working professional gunsmith.

Consisting of twenty-four tools, plus six additional screwdriver bits and a \$5 coupon toward the price of any gun book listed in Brownell's catalog, this kit includes:

- 1 No. 100 Sargent Parallel pliers, 4½ inches long
- 1 One-inch Brass/Nylon Hammer
- 1 No. 81 Magna-tip Solid Screwdriver Handle
- 7 Hollow-ground screwdriver bits

- 2 Instrument screwdrivers, sizes 2.3 and 2.9mm
- 1 Mainspring vise
- 1 MF-134 triangular India stone, ¾x4 inches long
- 1 Cleaning brush
- 1 ⅝x6-inch pin punch
- 1 5/32x6-inch pin punch
- 1 1/16-inch starter punch
- 1 3/32-inch starter punch
- 1 Set of replacement pins, two inches long
- 1 Nylon and brass drift punch set
- 1 Gunsmith bench knife
- 1 Eight-inch hand file, No. 2 cut
- 1 Sight base file
- 1 Four-in-one handrasp
- 1 Scribe hook

- 1 No. 1033-6 chain nose pliers
- 1 Screw Check'r
- 1 Tool box with three removable trays
- 1 Instruction booklet
- 1 No. 91 Allen wrench set

As of this writing, this kit has a price tag of \$93.75 plus postage and is an excellent start toward assembling gunsmithing tools. Additional tools will be found necessary as time goes by, of course. The beginner will find that each

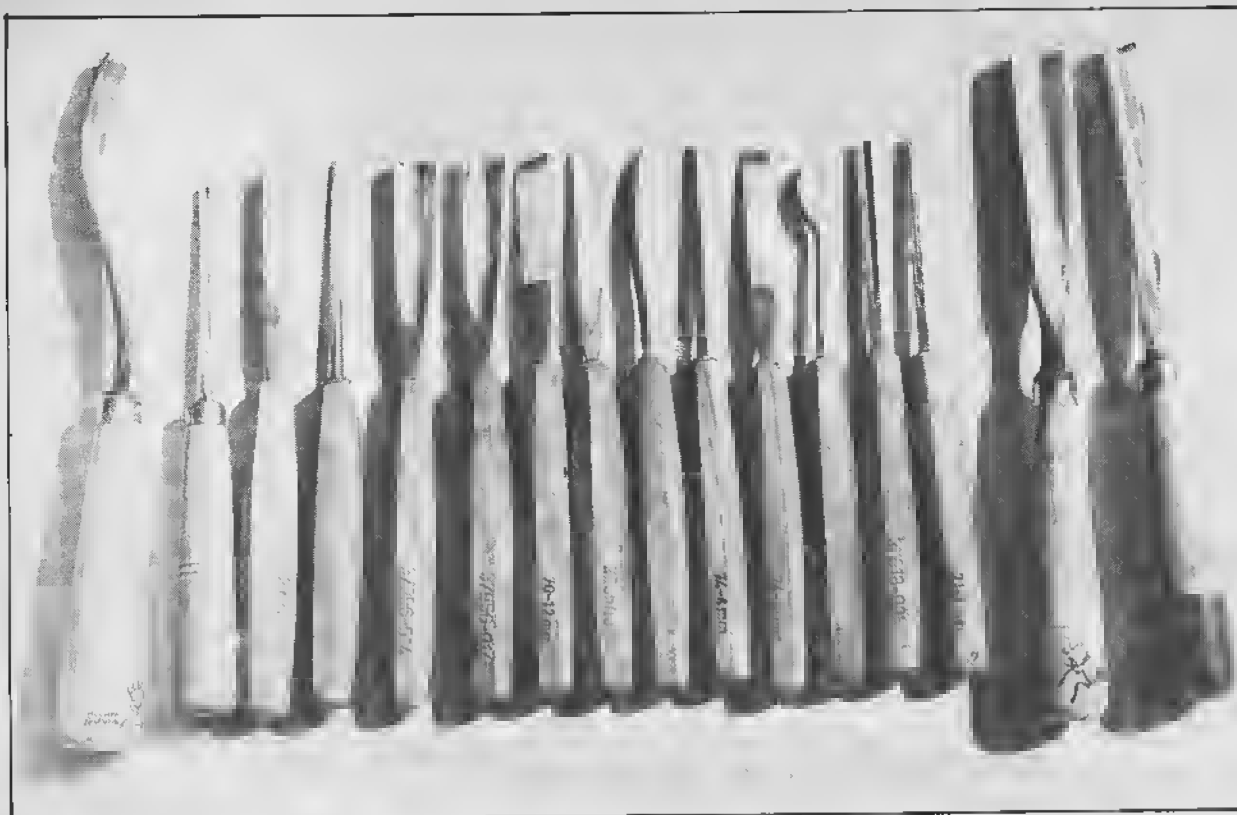
gun job will create a need for different tools — and a place to store them properly.

Aside from tools, the most important need for the gun hobbist is a solid workbench. On the bench should be mounted a quality bench vise with a swivel base. One soon will discover that this vise will be the most used tool in his shop. It should have removable jaws of cork, lead or other similar materials that will protect guns or other items being held in the jaws.

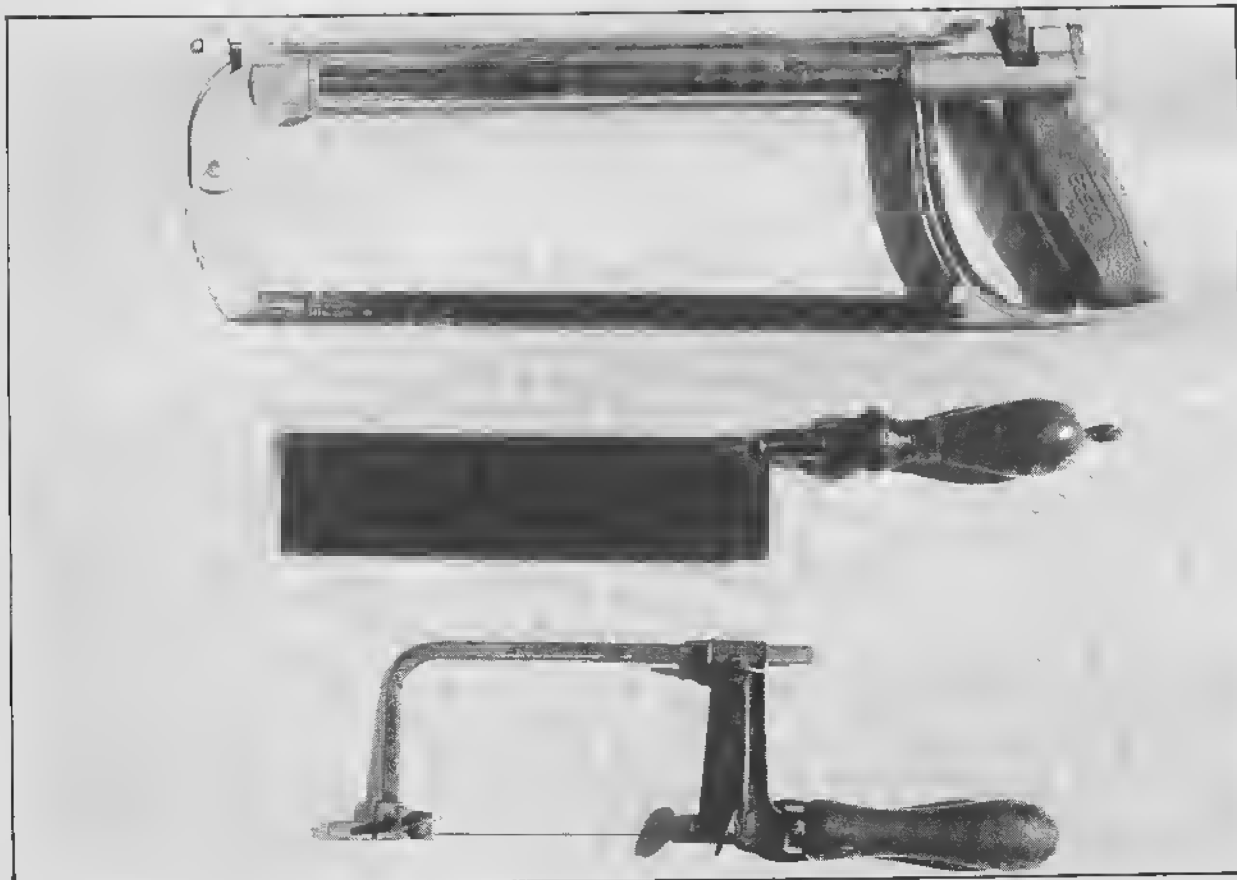
An assortment of quality woodworking chisels is an-

A set of instrument screwdrivers, a set of twelve Swiss needle files and a set of screw slotting files are recommended as highly necessary for most gun work.





Should one plan on extensive stock and wood work, these channel gouges from Buck Brothers and a full set of woodworking chisels by J.A. Henckel's Twin Brand are as good as money can buy anywhere, author says. (Below) The beginner should have a hacksaw such as the Challenger (top), a stiffback or miter saw for cutting stock for recoil pad installation (center) and a good jewelers saw for fine work on sights, inlays, other chores.



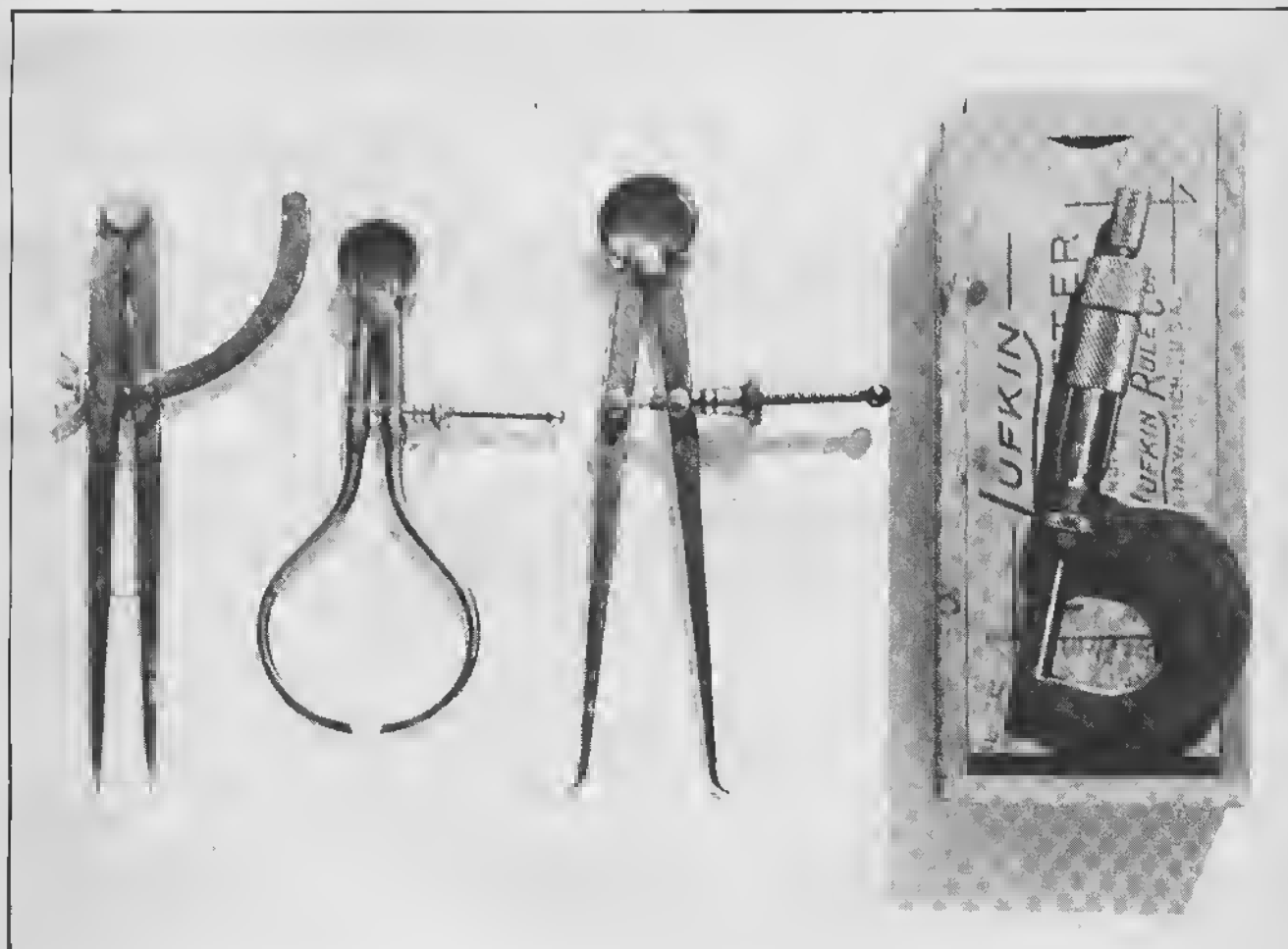
other must for the home craftsman. Keep them sharp and they will do their job properly. A dull chisel is worthless. With your sharp chisels, I suggest you keep a full box of Band-aids on the bench, just in case!

A serious home gunsmith never will have enough files. As a start, he should have on hand several sizes of screw head files. These are used primarily for recutting the slots in screw heads and, used properly, will do a neat, professional job. Recutting a screw slot with a hacksaw is taboo among real craftsmen. Metal checkering files are quite expensive, but when one desires to checker a bolt

handle or hammer spur, they are the only way to go. Swiss needle files are an absolute requirement in any gun shop, professional or amateur, so plan on saving for a complete set of the most popular shapes.

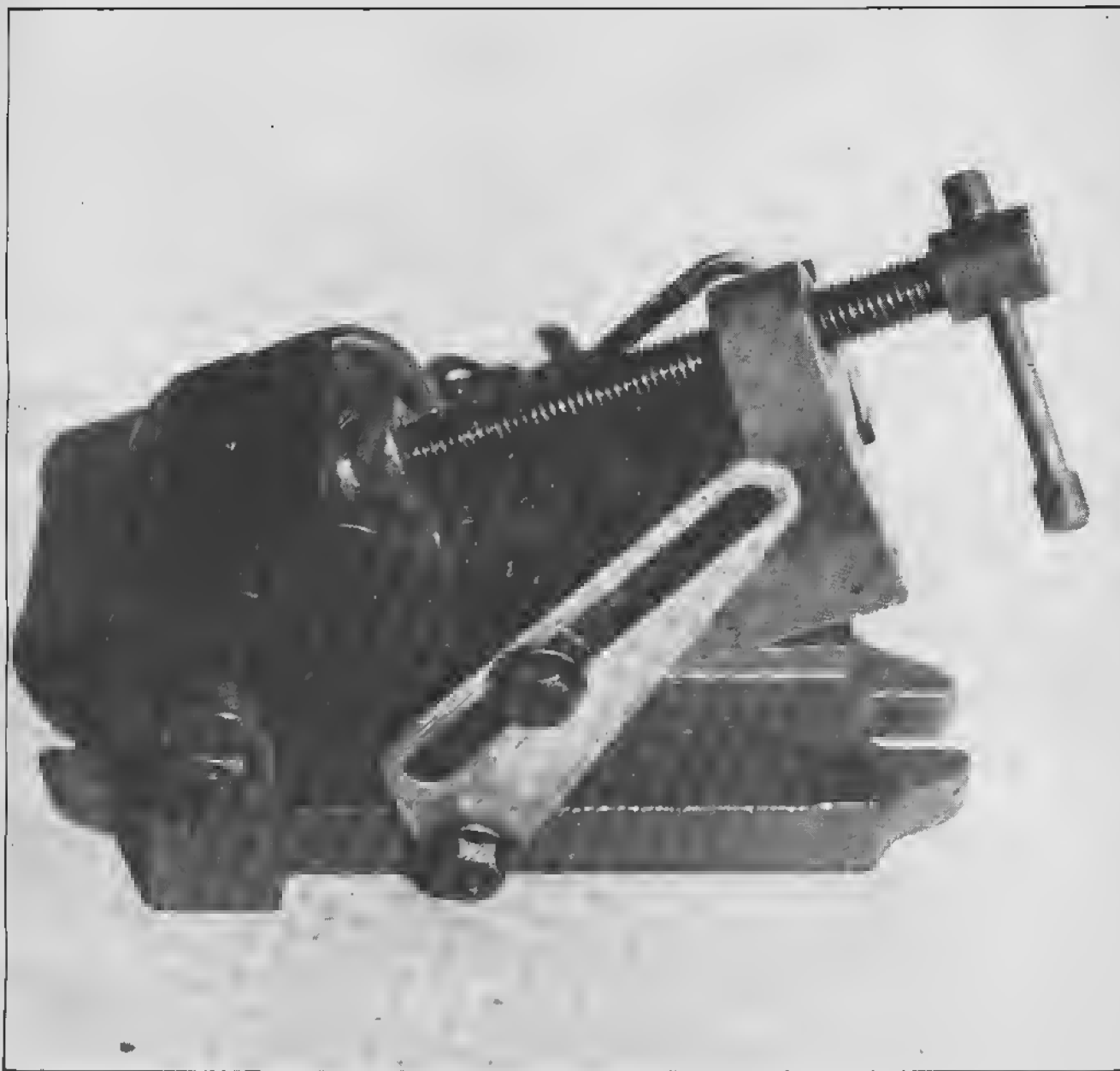
Thorough coverage of the various files and their uses could fill a sizable book in themselves, as there are so many of them, each made for specific purposes. There are sight base files, Barrette files, needle files, bent files, three-square files, crossing files, lathe and mill files, half-rounds, rattails, Pillar, Habilis, squares, mill bastards and knife

Even the novice should have a set of dividers, inside and outside calipers and micrometers, plus knowledge of use.





A set of screw extractors can pay for themselves in saved time in removing a broken or badly burred screw from a fine gun action. There is a variety of makes, but when selecting a set, buy the best and avoid the cheap ones.



In addition to a good swivel-base bench vise, a drill press vise can prove most valuable in that it may be carried from one location in your shop to another with the work in progress still clamped in its jaws for further work.

files and into near infinity. Eventually, one who works with firearms for any length of time will have need for all these files and many more.

In pursuing gun or stock work, one should have on hand a set of inside and outside calipers and a divider, all of good quality. A set of one-inch micrometers wouldn't hurt either.

The list could go on and on concerning tools that are, and might be needed eventually by the beginning gun craftsman but each individual will soon learn what is needed in this exacting profession. Don't go out and purchase a long list of tools just because they might be listed here. Wait until you need them, then when you buy, buy the best quality you can find.

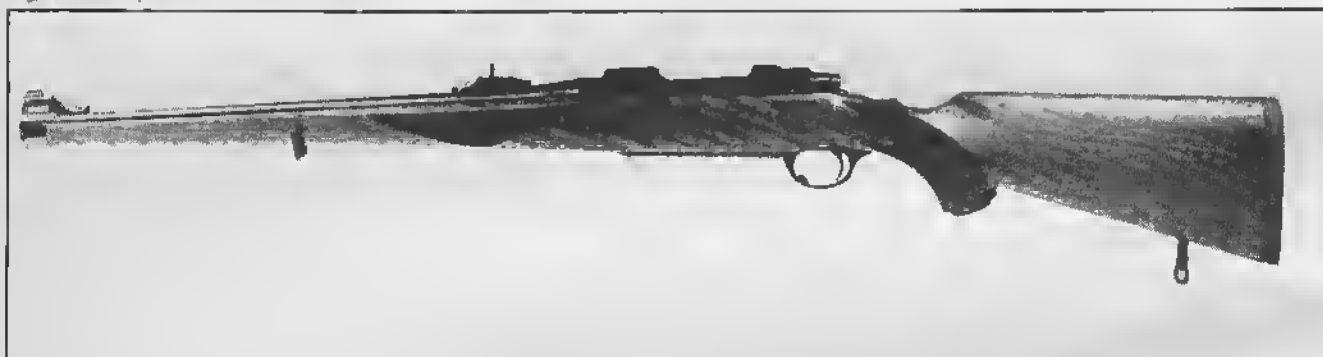
Chapter 2

TALK AND TIPS FOR GUNSMITHS

*Knowing Gun Grammar And How To Use A Wide Array
Of Tools Separates The Pro From The Amateur*



Churchill One-of-One Thousand is an example of rifle that is outfitted with half-stock. (Below) Ruger Model 77 bolt-action International features a Mannlicher-type stock.



OVER THE years, I have heard some pretty odd descriptions of certain portions of a gun's anatomy. In most cases, the individuals using these non-applicable terms were trying to converse with knowledgeable, even professional gun men. It only takes about five minutes of such conversation for a professional to read the novice like a book!

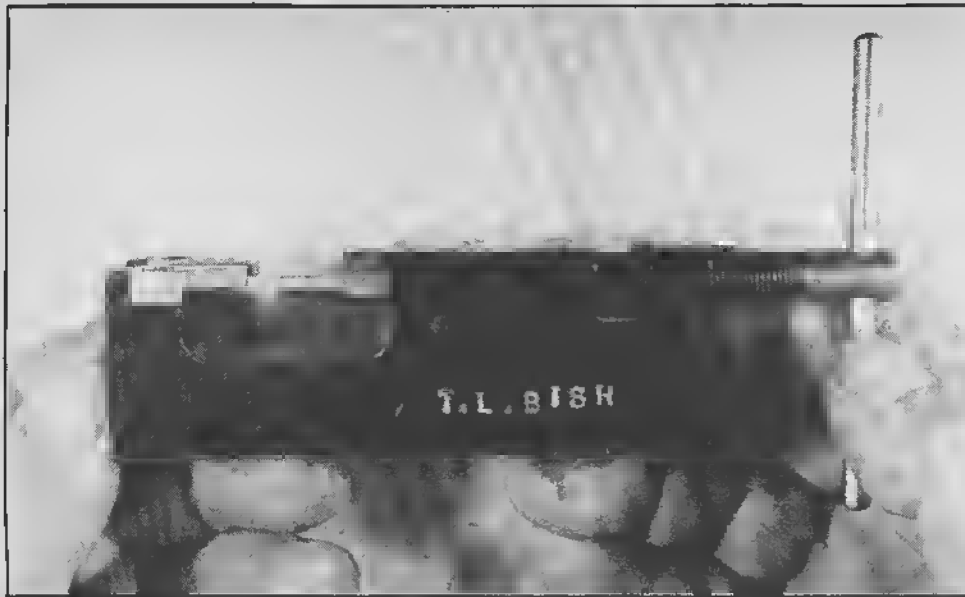
Perhaps one of the greatest abuses by tyros in the gun field is calling an automatic pistol a revolver. A revolver is a firearm having a round cylinder that revolves each time the hammer is drawn back. While it perhaps is correct to refer to a revolver as a pistol, it is dead wrong to call an automatic pistol a revolver.

There are various phrases in the world of firearms that must be mastered if one is to converse with the brotherhood of knowledgeable gunsmiths in an acceptable man-

ner, but there are neophytes in the firearms field who don't know a Schnabel from a swivel, nor the heel from the toe of a stock. While this can hardly be a complete glossary of firearms terms, descriptions and phrases, we all attempt to cover at least a few of the most abused terms.

First, consider the common rifle or shotgun stock; let's break them down to the proper definitions that apply to each part of this piece of wood. The gunstock proper is that portion of the wood found to the immediate rear of the trigger guard. It is composed of four basic sections: the small of the stock or pistol grip section, the comb, the heel and the toe. Should the comb of the stock have a raised section along its upper surface and a raised cheekpiece, this type of stock is known as a Monte Carlo. Should it not have this raised section, it is a classic-type stock.

The forend of the stock is that section forward of the



Front sight pusher eliminates necessity of pounding sight into the dovetail slot. The tool pushes the sight into position with screw pressure.

trigger guard. On a bolt-action sporting rifle, it can be either a half-stock sporter or a full-stocked Mannlicher type, which means that the wood of the forend extends to, or almost to the muzzle of the barrel. The half-stock forend ends about midway down the barrel.

This is elementary to the knowing gun fancier or professional gunsmith, but such simple knowledge can be invaluable to the novice in the field of gun lore. Learning correct firearms nomenclature can make a world of difference when one attempts to converse intelligently.

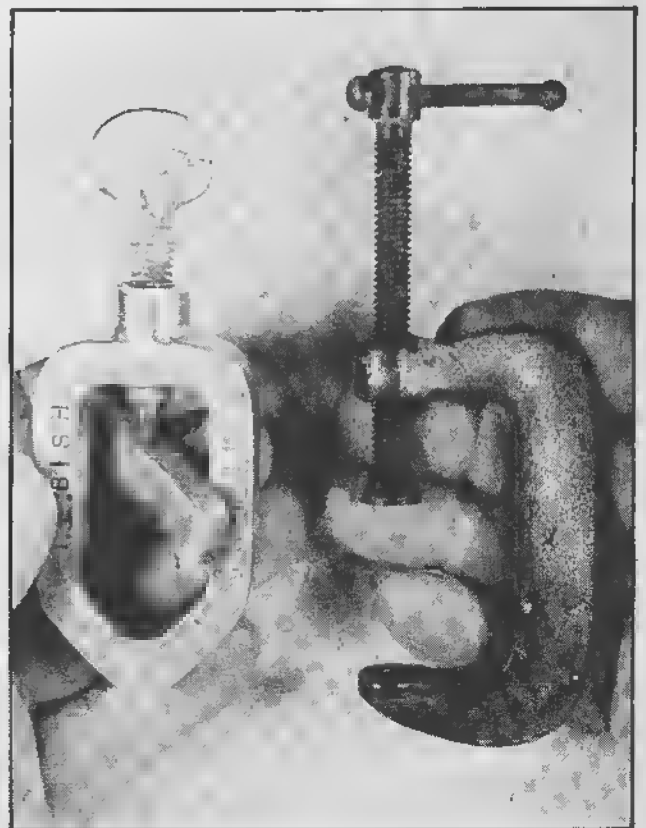
Then there is the trigger hassle. There are those who don't know the difference between a single-set and a double-set trigger. The single-set trigger is just that; a single trigger. This trigger is attached to an intricate mechanism that allows it to be adjusted to extremely light pressure, thus eliminating the heavier pull required to activate a standard trigger mechanism. The double-set trigger consists of two triggers attached to an adjusting mechanism. The rear trigger, when pulled to the rear, automatically sets the front trigger for the actual firing of the rifle. Both types of triggers are incorporated into some highly sophisticated target pistols such as the Hammerlis and Walthers.

There is a difference between an ejector and an extractor. While both are utilized to rid the gun's mechanism of the fired shell, their functions are decidedly different. The ejector consists of an automatic lever or device that causes the spent or fired shell or cartridge case to be thrown clear of the gun's mechanism. The extractor performs the function of actually withdrawing the fired case or shell from the chamber of the firearm. The ejector, working automatically, then forces the shell or case from the mechanism. I have heard people discuss the ejector when they often were referring to the extractor of a specific firearm.

Another pet peeve is individuals who refer to the ham-

mer of a rifle or pistol as a "cocking piece." The only cocking piece I know of is that part of a bolt-action rifle that extends out from the striker on the rear end of the bolt on bolt-action sporting rifles and it usually is locked in place by the bolt sleeve.

One of the most often used metals in gun ornamentation is so-called German silver or nickel silver. Both are identical in that neither contains any actual silver. German or nickel silver is composed of twenty parts nickel, twenty parts zinc and sixty parts copper. One may hear someone call this alloy "genuine nickel silver," when there is no



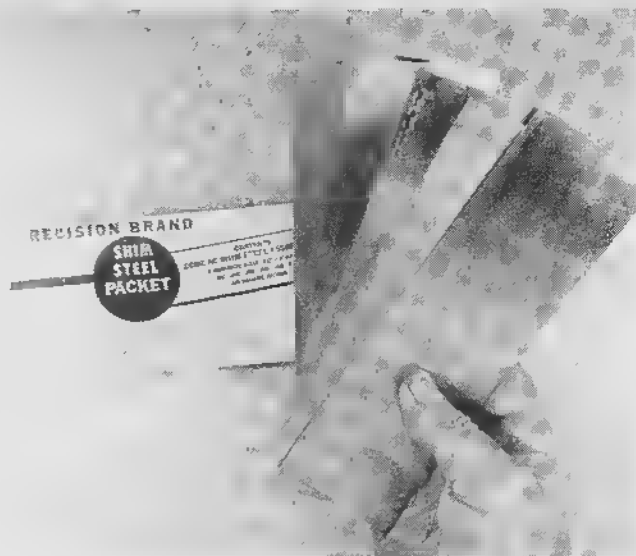
These devices illustrate the old and new ways of holding a ramp for soldering to a rifle barrel. Ramp soldering jig assures positive installation. The use of a C-clamp was uncertain, ramp slipping as solder became molten.

silver content whatsoever. The fact that the word silver is involved, leads some to believe they are dealing with a precious metal. It is not so.

On numerous occasions, I have had novices stare at me in question when I mentioned that a shotgun rib or sight ramp is sweated to the barrel. The term, sweating, does not refer to the moisture one is continually wiping from his brow while slaving over a hot gunsmithing bench! Instead, the term refers to a method of either soft or hard soldering used to install sight ramps, shotgun ribs, sling swivels and other gun components. This requires application of a thin layer of molten solder to the underside of the item to be soldered, then this piece is clamped to the other component and sufficient heat is applied until the solder fuses in a tight bond to join the two pieces of metal. It's a simple but grossly misunderstood operation.

In various sections of this book will be mentioned the term, "anneal." This simply means that the steel gun part must be softened before it can be worked with files or a hacksaw. This is accomplished by heating the steel, be it a part or spring stock, to a dull red color, then allowing it to cool slowly. The more slowly it cools, the softer will be the steel. Following this annealing process and whatever filing or cutting is needed, the part once again may be returned to its original state of hardness by heat treating. This requires heating the metal to a cherry-red shade, then quenching the steel in oil. The degree of hardness will depend upon the method used in heating and quenching. The word anneal means to render soft. Annealing of non-ferrous metals, such as brass or copper, is accomplished in a different fashion.

There are various specialized instruments and tools designed specifically for work on various firearms. Common tools such as hammers, hacksaws and certain types of files are more or less understood by even the novice. How-



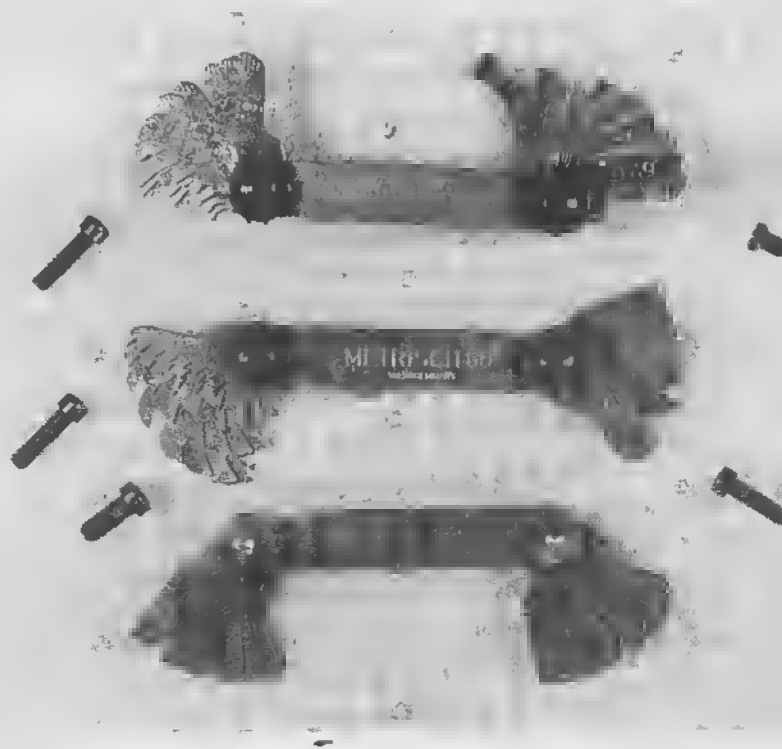
Steel shim stock in varying thicknesses is available to gun workers in kit form. This material is essential for proper mounting of scopes and some sight work. It can be cut to the required size with just simple tin snips.

ever, when more technical tools and instruments are mentioned, the amateur often is at a loss.

The front sight pusher, one of the most used tools in any gun shop of any size, is just that: an instrument for pushing a gun sight from or into the slotted barrel or ramp of any rifle or pistol that is equipped with dovetail sights. This tool is screw activated and designed to install or remove dovetail sights without damage to either the sights or the firearm.

Before this tool was designed, gunsmiths found it necessary to remove or install such sights by the hammer and

Screw pitch gauges in the English screw pitch, metric pitch and the BSW (British Standard Whitworth) are an absolute necessity in the tool kit of gun craftsman.



SCREW CHECKER BROWNELL'S Gunsmith Tools Montezuma, Ia. 50171						
SIZE	1	2	3	4	5	6
DRILLS → 48	54	64	72	53	56	53
DRILLS → 43	56	64	50	SCREW	086	
DRILLS → 38	48	56	45	CHEK R	099	
DRILLS → 35	40	48	42		112	
DRILLS → 30	40	44	37	U.S. PAT. 2728145	125	
DRILLS → 28	32	40	36		138	
DRILLS → 23	32	36	33		164	
DRILLS → 19	24	32	29	RUELLE BROS. 1960	190	
DRILLS → 16	24	28	21		216	
DRILLS → 12	20	28	14		250	
DRILLS → 7/32	18	24	3	7/32	312	
DRILLS → 5/16	F	I	9/32			

Thread gauge or screw checker plate quickly identifies exact size, number of threads per inch of most screws used in gun repair. Gauges vary from 5/16-inch down to #48 and includes most variations in screw thread sizes.

copper rod method. In this practice, the sight was held in place, the copper rod was placed against the sight edge, then the sight was driven into the slot by tapping the copper rod with a hammer until centered exactly on the barrel or ramp. The sight pusher eliminates such pounding. Instead, the sight is literally pushed into the dovetail by screw pressure.

Another superlative tool is known as the ramp soldering jig. This tool eliminates the touchy chore of sweat soldering a ramp front sight to either a rifle or pistol barrel. Most often, in soldering a ramp to the barrel, the ramp has a nasty habit of sliding out of plumb to the barrel when the solder is heated and becomes molten. Using the ramp soldering jig, the ramp is held firmly in place on the barrel and a perfect no-fuss, no-muss job can be accomplished in a fraction of the time it once took.

Prior to the development of the ramp soldering jig, C-clamps were used by most gunsmiths to secure the ramp in place for soldering, but even this method had its drawbacks; unless the C-clamp was specially ground to conform to the shape of both the ramp on one side and the contour of the barrel on the other, it still had a tendency to slip.

The ramp soldering jig is designed so virtually no heat is dissipated from either the ramp or the barrel section when heat from a torch is applied. Once the solder has become molten, the torch is immediately removed and the new



A wide assortment of screws for installation of scopes, mounts, rings is a must. The Brownell's kit will supply most requirements.

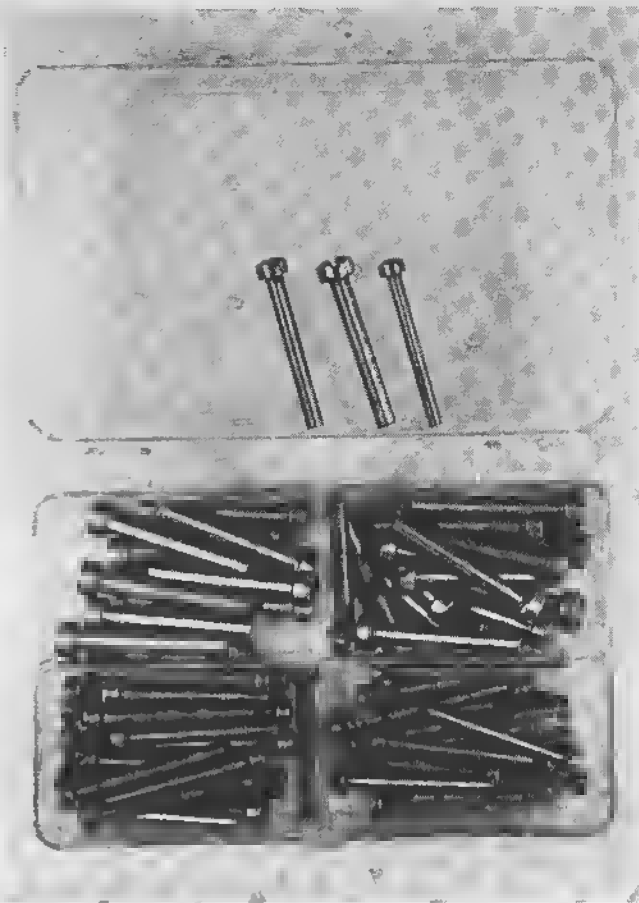
assembly is allowed to air cool, thus forming the union between the new ramp and barrel surface.

Yet another abused gunsmithing trick is the use of shims for leveling up a newly installed scope mount. When installing a new scope mount base, the contours of the rifle receiver and those of scope mount are not always exactly compatible and do not ensure a perfectly aligned scope.

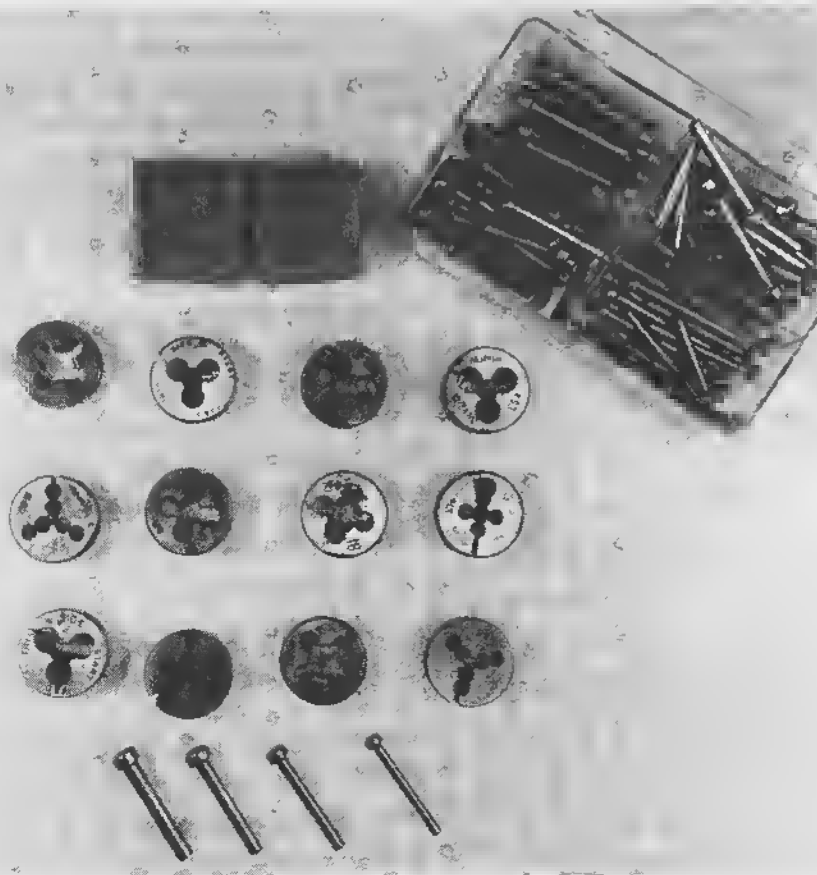
This means that some sort of shimming is necessary between the scope mount base and the contour of the rifle's receiver. Even today, there are still professional gunsmiths who persist in using thin strips of cardboard — even a section of business card — to shim a scope mount. Common sense should tell them that this cardboard will compress after the base screws have been cinched up tight. In time, this will result in a scope base that becomes loose. Poor accuracy results from the scope shifting its point of aim with each shot fired.

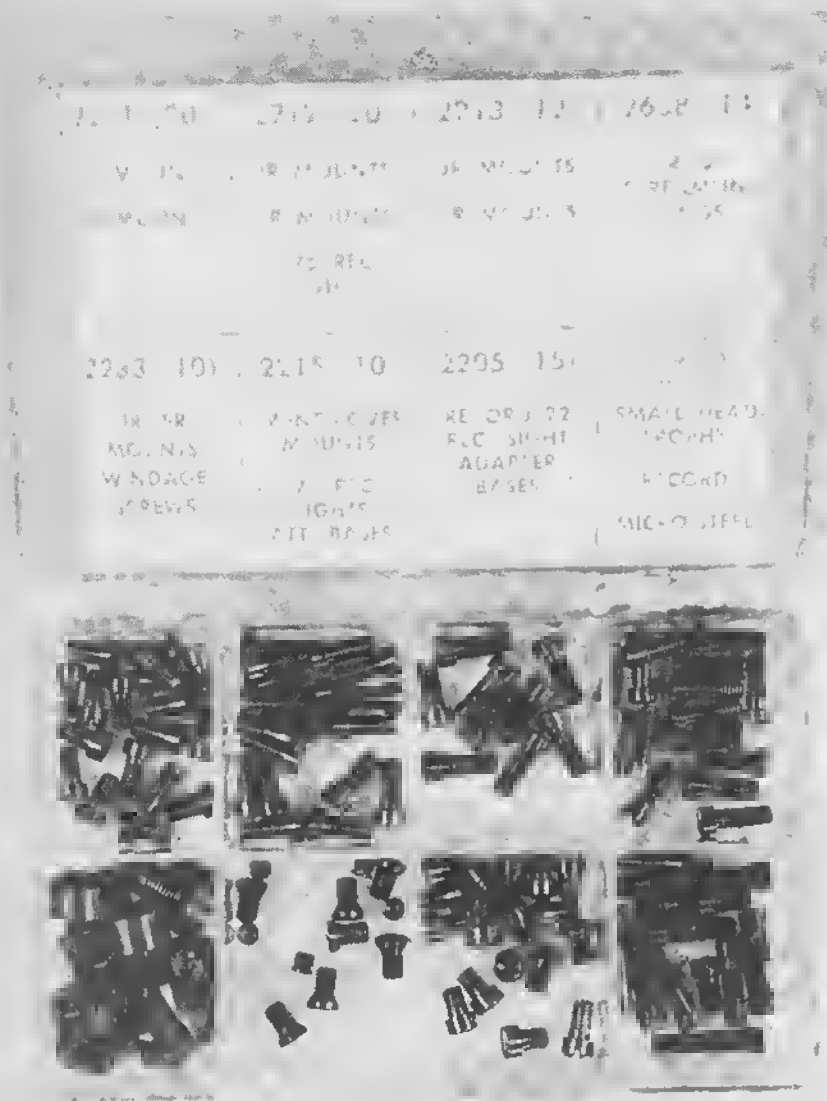
The only solution is to use nothing but steel shim stock available from most gunsmith supply houses. In either pre-cut or in sheet form, this steel stock is available in kit form with thicknesses of .001-, .002-, .003-, .005-, .010- and .015-inch and in sheets measuring 2½x8 inches. The cost of such a shim kit is less than three dollars and can be used to do countless shim jobs.

The majority of experienced gunsmiths know that one of the broadest phases of gun butchery is the use of screws that do not fit the threads in the gun's receiver, scope mounts or rings, sights or any other component where screws are used. I long ago lost count of the so-called bastard screws I have found stripped into the threads of the



Above: Unthreaded assortment of screw blanks is valuable to a gunsmith. Screws can be made that are not available through other sources. (Below) Threading dies in popular gun sizes are needed if one has to thread screw blanks.





Screws to fit all Redfield scopes, mounts and most receiver sights are included in this kit. The screws also will fit several other makers' scopes, mounts and receiver sights.

above-mentioned gun components. This often results in stripped threads that require hours of work, if the problem can be corrected at all! It takes only a few minutes to strip the wrong screw into the receiver of an otherwise fine firearm. If one is lucky, the receiver of the arm may be of tougher steel than the screw, which results in only the screw being stripped. But should the receiver of the gun be on the soft side and the screw of hardened steel, the end result can be a screw hole that is stripped out beyond repair — and possibly a ruined firearm.

Found in the tool kits of any knowledgeable gunsmith will be a complete set of screw pitch gauges and screw checker plates. These tools are utilized to determine the exact size of the screw, the exact pitch of the threads and the number of threads per inch. They are available in English screw pitch, metric screw pitch and British standard Whitworth (BSW). These tools are essential for one doing any amount of gun work, whether as a hobby or on a professional basis. They can save a lot of headaches, to say nothing of preventing the possible ruin of good guns.

The gunsmith or gun hobbyist is often stuck with the problem of not having the correct screws on hand for a par-

ticular job. Should this lack involve scopes or scope mounting, the problem is easily solved with the sightbase screw kit available from Brownell's. These kits will provide about ninety-nine percent of the screws needed for scope or iron sight installation.

The correct screws for such military rifles as the Mausers, Springfields and even Japanese Nambus are available from some gunsmith supply houses. For such domestic firearms as Colt, Smith & Wesson, Winchester, Remington, Marlin, Ruger and Savage, these screws must be obtained from the specific manufacturers. In most cases, screws for such arms are specially made and cannot be bought at the local hardware store.

Available from Brownell's is a blank screw kit which consists of a variety of the screw sizes most used in gun work. All that is necessary to use the blanks in this kit is to have a varied supply of threading dies in gun screw sizes. With such a setup, one is able to make hundreds of variations in most thread sizes, head shapes and lengths. The main drawback is availability of the correct die sizes with which to thread these screws; these also are available from Brownell's, but are quite expensive per set.

Chapter 3

A MATTER OF PROTECTION

Proper Care Of Your Tools Is An Aid To Efficiency And Protects An Important Investment

ONE OF the first truths the newcomer to home gunsmithing will discover is that quality tools are not cheap.

Even though top-quality tools eventually will pay for themselves, both in longevity and the quality of the work they are used to turn out, one can quickly expend hundreds of dollars for only a few of the varied tools needed in everyday gun work. In time, this cost can easily multiply into several thousand dollars, especially when one enters the various phases of gunwork requiring highly sophisticated precision tools.

From the moment one purchases his first good — and probably expensive — tool, he should begin thinking about its care if he wants this particular purchase to last for many years to come. Giving a few minutes consideration to a tool

can prevent it from becoming rusted, nicked, dulled or just plain beat-up.

Naturally, there are some expensive tools that will tend to wear or dull with age. Chisels may become dull, requiring frequent sharpening, resultantly wearing down the length of the blade; files will become dull through natural use and eventually must be relegated to either the trash box or set aside for other purposes. High-speed drills also will become dull with extensive use and must be sharpened, thus shortening their length. But this all takes place over a period of years, not in a few weeks or months.

So what should the newcomer to gunsmithing do about caring for tools properly? The answer to this is simple. One can protect them from misuse and possible abuse through negligence by checking each tool periodically for dullness,

After completing a gunsmithing job, the author sorts out his tools and replaces them in cases specially designed for them. He insists that continuing care of implements of the trade will pay dividends in continued long use.





Popular with most working gunsmiths is the seven-drawer Kennedy tool chest. In addition to the drawers, it also has a large storage space in its top section. It is ideal for storing precision tools. (Below) Author considers the H. Gerstner & Sons solid oak machinist's tool chest top of the line. No longer made, it is difficult to find today and is quite expensive. The model illustrated has eleven large drawers.



rust caused by friction or rubbing against other steel tools.

The first consideration one should give his tools is a proper place to store them when not in use. This should be located in the vicinity of the workbench where each and every tool will be handy at a moment's notice. This storage area can range from a common toolbox with trays to a deluxe Kennedy seven-drawer model or even an elaborate — and costly — solid golden-oak eleven-drawer machinist's chest from H. Gerstner & Sons. This type of chest no longer is made, but they can be found at gun shows and swap meets. Or one may prefer — providing he has a large array of tools — to go the route of the larger roll-away tool chest which can have any number of drawers, depending upon which model one prefers. This type of chest also features a large storage space, usually at the bottom of the roll-away. Such models usually begin in price at around \$300.

Should one want to add the various accessory tool chests to sit atop the basic roll-away, then the price can escalate to as much as \$600 — or more — for the complete stack.

Should you already have a good toolbox or roll-away as an ideal place to store your tools, even this is not enough to fully protect your tools; this is especially true of those having teeth or sharp edges. After all, one doesn't just throw a bunch of expensive die sinker's files or equally expensive high-speed or carbide drill bits into a drawer and let it go at that. These tools must be protected, one from another. A hardened steel file being thrown into a drawer with a set of micrometers or good chisels means ultimate damage to something. Save your files for actual work on the bench; don't let them do a harmful job on your other tools inadvertently.

Some years ago, while thumbing through the gunsmith's Dream Book, the Brownell's catalog, I spotted a new product that they were offering client gunsmiths. Listed as the Celluplastic Shop Assortment, this kit consists of twenty plastic tubes varying in size from three-eighths up to seven-eighths inch in diameter and eighteen inches in length. Furnished with these tubes are some two hundred plastic caps, which are assorted to fit each of the tubes furnished.

These plastic tubes may be cut with a pair of scissors to

Like the Kennedy model, this Gerstner tool chest features seven drawers and a large storage area under the hinged lid. Either of these styles Bish considers ideal for safe, locked storage of costly precision tools.





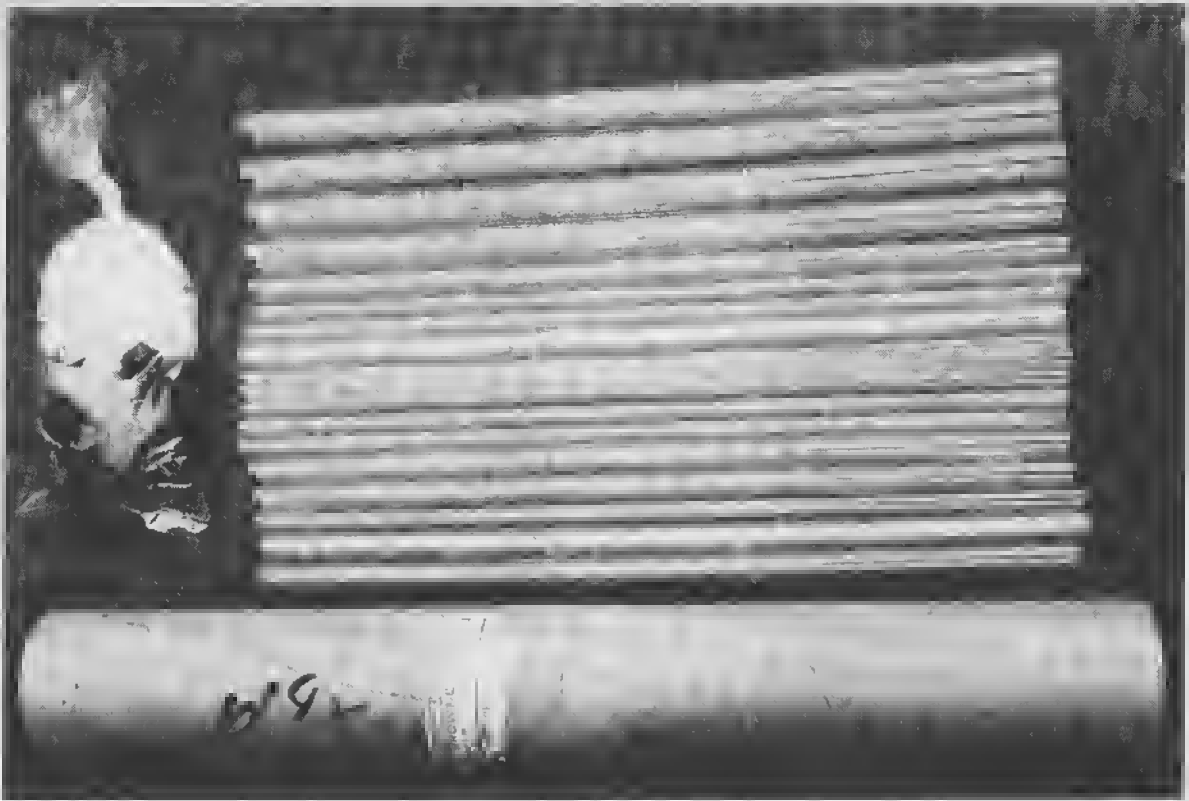
While roll-away tool chests are available in a variety of styles, this is the type preferred by the author. It features nine roomy drawers for storage of costly tools, gun parts and materials.

the length required, the caps inserted into each end of the tube. The result is a protective, dust-proof and friction-free container that is certain to fully protect such tools as taps, drills, files, reamers, scribes and a myriad of other tooling having diameters of up to seven-eighths inch and a length not to exceed eighteen inches. These tubes are of transparent polyethylene so that the proper tool in the proper size can be selected at a glance.

In addition to tools, I have found these tubes to be unex-

celled for maintaining expensive mink hair touch-up brushes; the bristles thus can never be bent or misshaped through friction with other materials. These tubes also can be ideal for storing expensive sight base files, extra-narrow pillar files, fine-toothed round files, ad infinitum.

I have found it best to dedicate each drawer of both my tool chests and the roll-away to accept specific tools. I have one drawer set aside for nothing but storage of high-speed drills, gun taps and dies and drill and thread gauges.



The cellulplastic assortment from Brownell's, which is described tully in text, can be one of the best investments by craftsmen for protection of his tools against rust, dust and friction. (Below) The heavy plastic tubes can be cut to any length up to 18 inches for tools to $\frac{7}{8}$ -inch in diameter. Plastic caps are turnished.



When a drill or tap of a particular size is needed, I know exactly which drawer to open. Another drawer is reserved strictly for my chisels. Each chisel is laid in place carefully so that the sharpened ends will not rub against any material that might dull them. Another drawer contains nothing but precision instruments, such as dial calipers, micrometers, vernier calipers and tools of that nature.

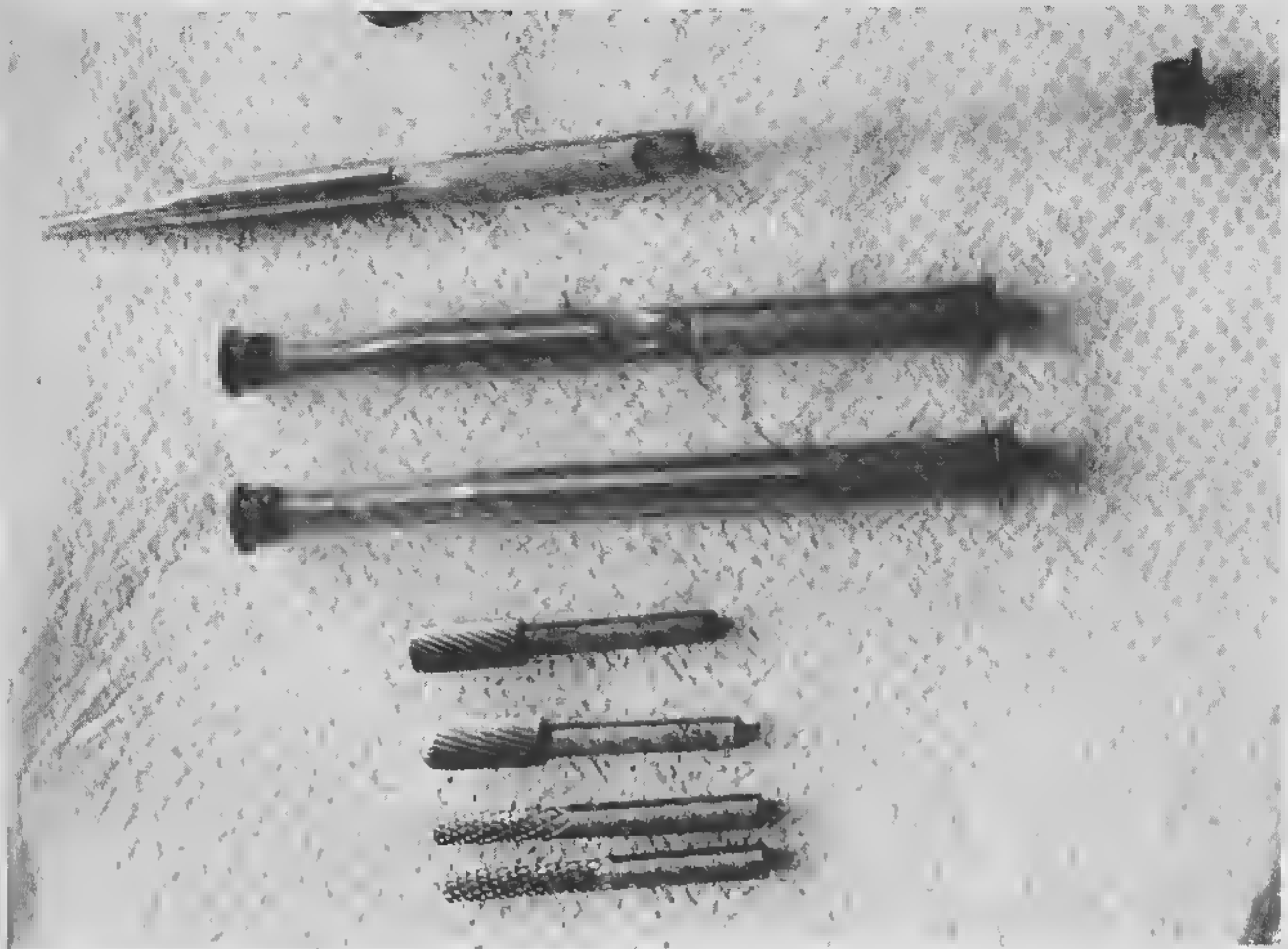
The basic reasoning behind this is that I detest having to

look all over the shop to find some elusive tool. With the system outlined, I know exactly where each tool is located and can have it in hand in a matter of moments. This method of organization saves a lot of frustration and lost time, both of which cost the working gunsmith money and gray hair!

As you will find repeated throughout this book, tools are of the ultimate importance to the professional gunsmith

Costly precision tools such as these shotgun choke reamers and the hone can be amply protected when they are inserted and stored in the plastic tubes that have been cut to the proper length.





Carbide rotary files and chambering reamers are costly and thus deserve the best of treatment for preservation. These are receiving such treatment, being encased in the plastic tubes and the ends plugged with furnished caps.

and the beginner alike. Without them, the gunsmith would feed on beans three times a day instead of the occasional hamburger. The beginner would be better off making pottery or taking up tatting as a hobby. The tools make the big difference!

Once in a while of late, I have brought myself to attend a so-called flea market or swap meet, or even a so-called gun show that as a rule falls into one of the two previously mentioned categories. In these forays, I occasionally run across acceptable and expensive tools of bygone years. Early American, English and German-made tools are sometimes quite desirable due to the quality of their materials

and craftsmanship. I have been fortunate enough to acquire such items as fine, beautifully made ball-peen hammers, bench saws, vises, all-steel machinists' squares and an assortment of other desirable tools which, if they were made today, would cost a young fortune.

For the most part, these tools required nothing more than thorough cleaning and sometimes a light polishing to bring them back to as-new condition. Admittedly, tools of this quality and age are hard to find, even at flea markets, because there are other guys just like myself who fully appreciate their worth and snap them up quickly. As a rule, tools such as these can be bought for little or nothing,



Drawers in your chest should be arranged so related tools are at hand at a moment's notice by opening only one drawer. Drills, taps, assorted dies, as well as sizes of screws are stored in this drawer.

depending upon who is selling them. On the other hand, there are some sellers at flea markets who ask a fortune for just about any piece of junk! For the most part, the tools described were manufactured from the 1890s through the turn of the century, when quality of craftsmanship was at its prime.

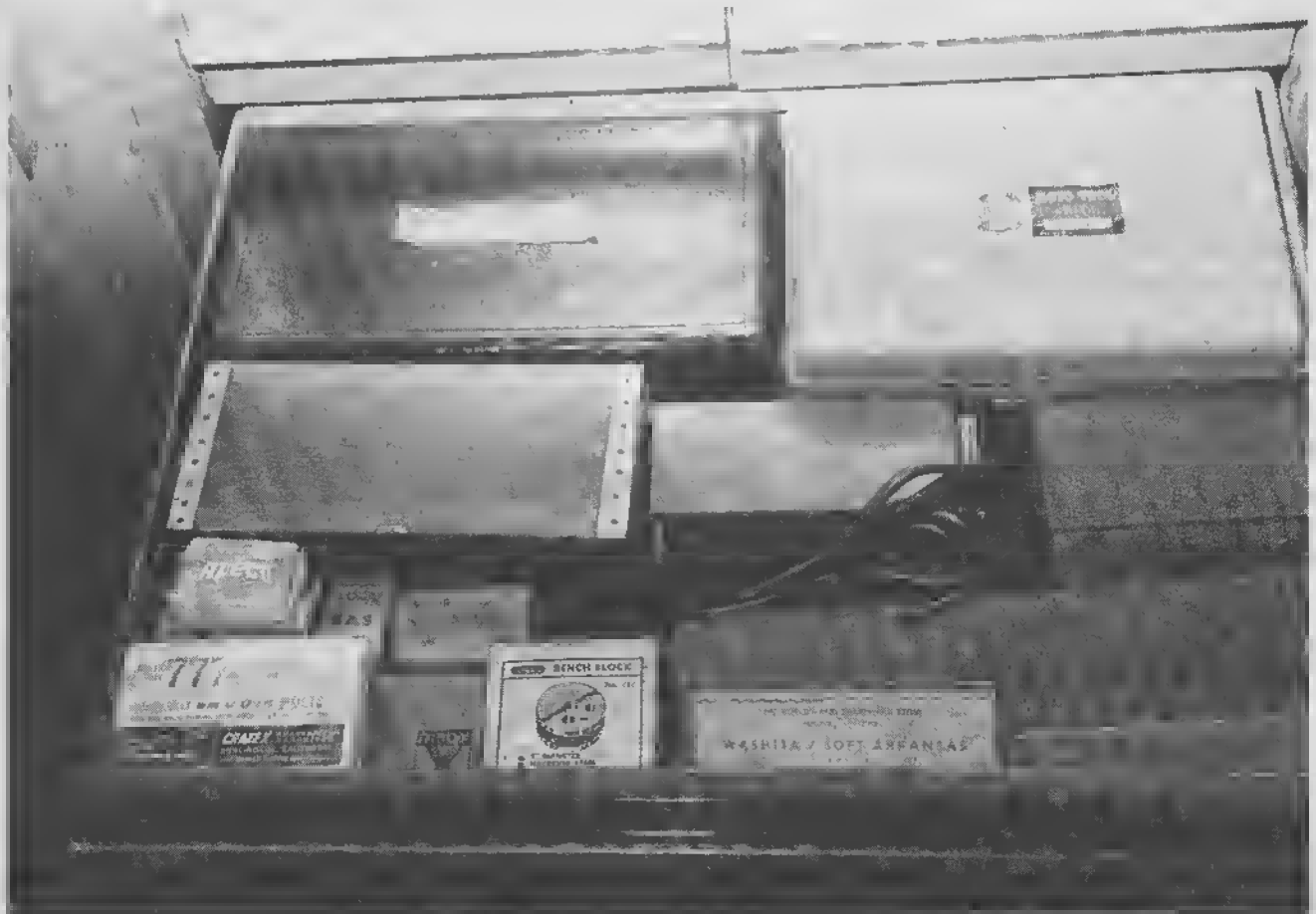
Like anything else that is worthwhile, tools become a big investment. Like the finest automobile or television set, they require proper care and maintenance if they are to be expected to perform the job for which they were designed. An occasional light oiling of bare steel, unplated tools prevents rust and discoloration. Precision tools, such as micrometers, must be kept spotlessly clean to assure their accuracy. Rust on the teeth of files can render them ineffective and dull in short order, rusted drill points cut jagged, untrue holes and the same is true for taps and dies that won't cut clean threads if rusted.

In addition to toolboxes, chests and roll-aways, one should, if at all possible, have various racks, shelves or doored cabinets located in, around or above the workbench. These spaces might hold the tools that are used most often. This would include screwdrivers, files, pliers

and snippers, hacksaws, small bench anvils, pin punches and any number of other items that are in constant use each day. Every bit as important to the gunsmith as his tools are such items as oils, gun greases, stock waxes, stock finishes, fillers and similar concoctions that might fill a nearby cabinet outfitted with doors. Metal-coloring agents such as gun blues for touching up worn spots, solder blackeners, plum brown solution and other acid-type preparations should be kept in a nearly airtight cabinet, as these can cause tools to rust in just a few hours if exposed to fumes they tend to emit. Thus, it is best to store preparations such as these far away from your tools; the same is true for soldering acids. Never attempt hot bluing in a shop full of tools — you'll rust 'em.

Some of the old-timers in the field of gunsmithing have, on occasion, been accused of giving their tools the diaper treatment, treating their tools as though they were infants of the family. This may be true to a degree, but I have found that these old-timers are the gunsmiths who turn out work that can only be judged as superlative. They are craftsmen of the highest order and the care they give their tools reflects the care they put into each and every job they turn out.

The author favors one of the larger drawers in roll-away tool chest for storage of such electric handtools as his Dremel Moto-Tool, an engraving tool, speed indicator and the checkering tool with which he does most stock work.



Chapter 4

WORKSHOP LAYOUT

*It Doesn't Have To Be Fancy, But It Should Be Efficient
And Organized For Convenience And Tool Preservation*

NOT EVERYONE can boast of a spacious shop equipped with deluxe hardwood paneling and cabinets, shelves and storage space galore, plus all the appointments and frills that amount to a plush place to work on guns.

The majority of the craftsmen I know who conduct gunsmithing on a hobby basis have nothing more than a corner in their garage or a small backyard shed in which to set up a workbench. If lucky, they may even have room enough to install a storage cabinet or two for their tools and such necessary items as stock finishing oils, bottles or touch-up gun blues and the like. So, we'll come down to earth and discuss "shop talk" as it pertains to the majority of craftsmen who seek to do gun work on a hobby basis.

Over the years, I have owned several successful gun shops, complete with all the headaches accompanying such an operation. Long ago, I learned that it isn't the work area that results in fine craftsmanship but the ability of the man himself and his skill in handling tools correctly — plus a whole lot of gun savvy. I know of amateur gun craftsmen who could be literally swamped with outside work if that was their desire. However, most are content to keep their gun tinkering on a strictly amateur basis, not taking in pay jobs from outsiders. As one told me recently, "Then it would become work, not fun and I do this strictly for the enjoyment I get from it. I know that many gun hobbyists have this attitude but still will do a minor job or two for friends once in a while."

But let's get back to that situation of setting up a shop in an area where space is limited. First off, I know of several gun hobbyists who have nothing more than the kitchen table on which to perform their gun chores — much to the discomfiture of their wives. However, let's assume that

you do have a garage, or at least a shed of some sort on your property and that it is equipped with electricity.

The first consideration will be a good, solid workbench. This should be constructed from a good grade of pine or fir, using 2x4s for the legs and 2x6s for the top. It should measure at least six or seven feet in length by twenty to twenty-four inches in width. The height of the bench should be in proportion to the craftsman's own height. A few inches above waist level is usually ideal. The cross braces of the bench — those attached to the legs — should be bolted to the studs of the building in which the bench is located. Bolts measuring one-quarter-inch in diameter by about five inches in length are required.

Once the legs are firmly bolted in place, the top may be installed, placing the 2x6s lengthwise. These should be nailed in place with eight-penny nails. It is a good idea to cover this top of 2x6s with a good grade of one-half inch plywood, thus providing a smooth surface on which to work. In my own shop, the plywood has been sanded and coated with spar varnish.

Perhaps the most used tool in any gunshop is the much-taken-for-granted bench vise. Again, this tool should be of good quality and have a swivel base that will allow it to be turned 360 degrees.

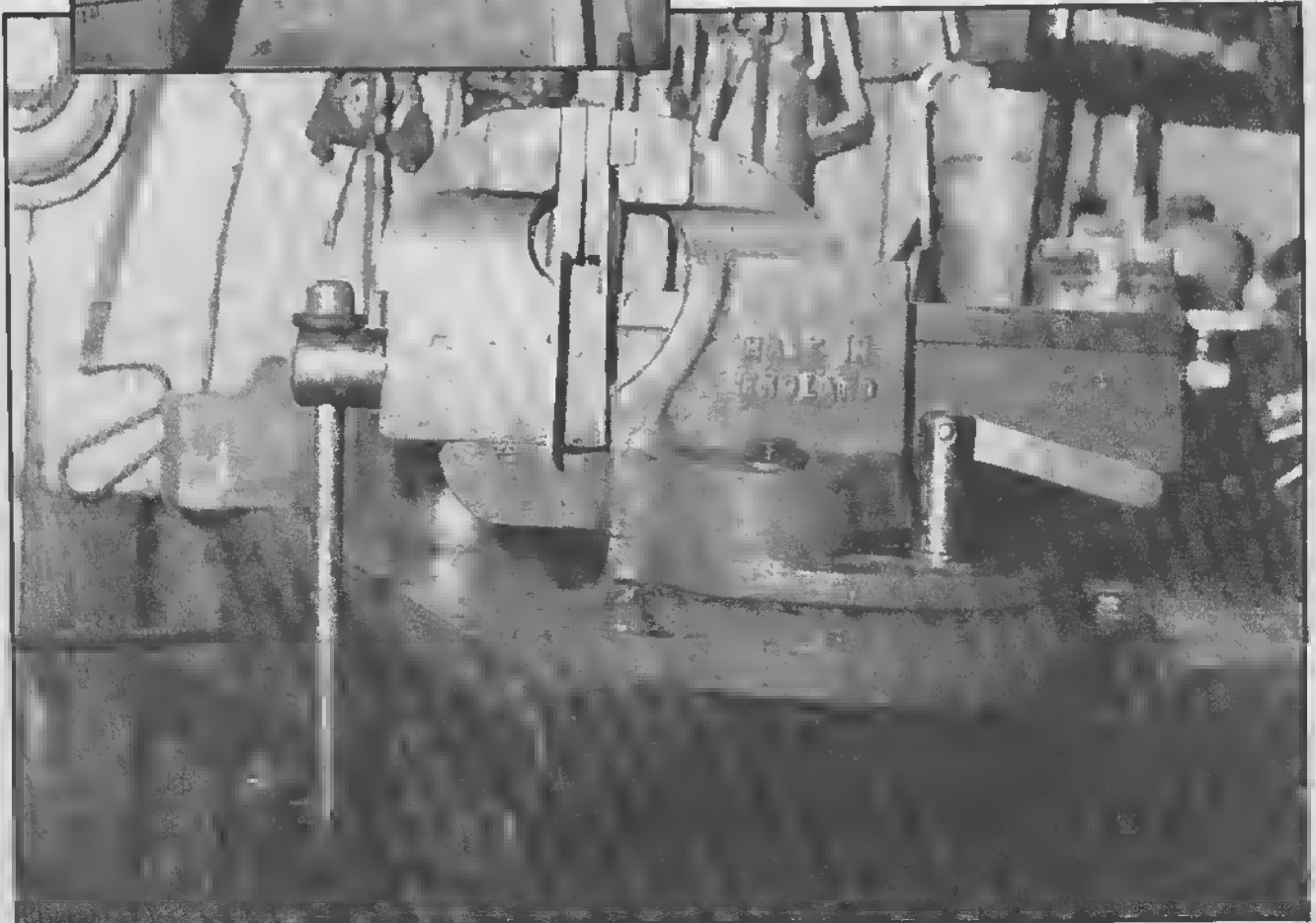
Using hardened steel bolts and nuts, mount the vise near the end of the workbench where there is the most room. Remember that you probably will be working on rifles and will need extra room around the vise to accommodate the rifle's length.

At this point, let's assume that you have your bench in place. It is solid enough that nothing will pull loose when great pressure is exerted on the bench vise, or a barrel vise, should you ever get into this stage of gun work. The last



Stock oils, waxes, gun cleaning oils, wood dyes and similar items should be stored in a cabinet for handy use.

A quality swivel-base vise is one of the essential needs for a well-equipped gunsmithing shop. It will prove to be one of the most used tools in the shop.

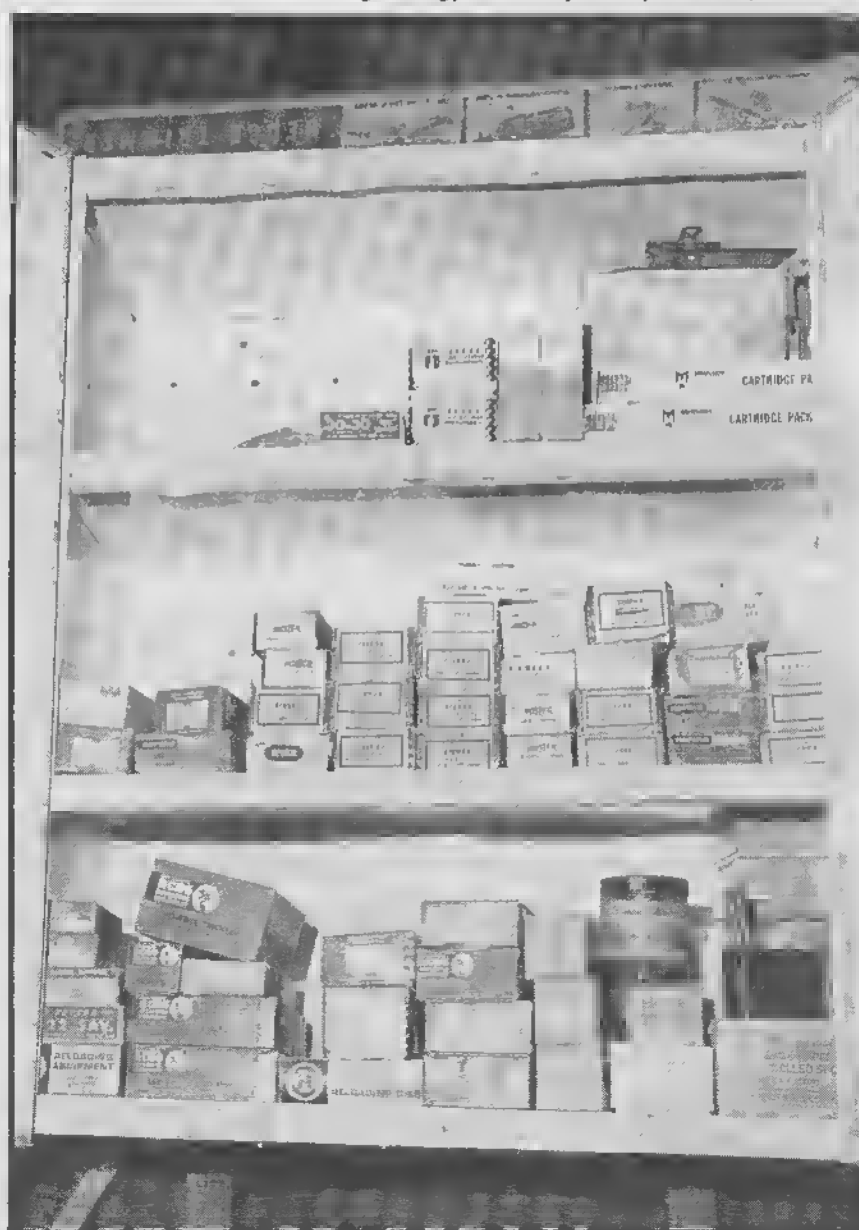


thing needed on the bench will be a piece of short-napped carpeting on which to lay guns. This carpeting is used only as needed and should be removable from the bench.

Any gun worker never can have too much storage space. The longer you are in gun work, the more space you will need for storing extra barrels, stocks, gun parts, et al. Too, space will be needed for the many cans and bottles of stock

oils and finishes, cleaning equipment, touch-up gun blues and the myriad of other compounds and concoctions necessary in the gun repair field. Cabinets to accommodate these gunsmithing necessities should be built near the workbench where they will be handy. The size and quantity of cabinets a gunsmith might desire will have to be left up to his own requirements.

Reloading components such as bullets, cartridge cases, reloading dies can be stored in a cabinet of their own near the reloading bench should the gun craftsman include this facet of gunology in his day-to-day arms experiments.



At this point we have the workbench, as well as the cabinets to accept all the preparations for stock and metal coloring. All are built solidly. The main items now are the tools. As expressed in another chapter, gunsmithing tools are quite expensive and they require extra care.

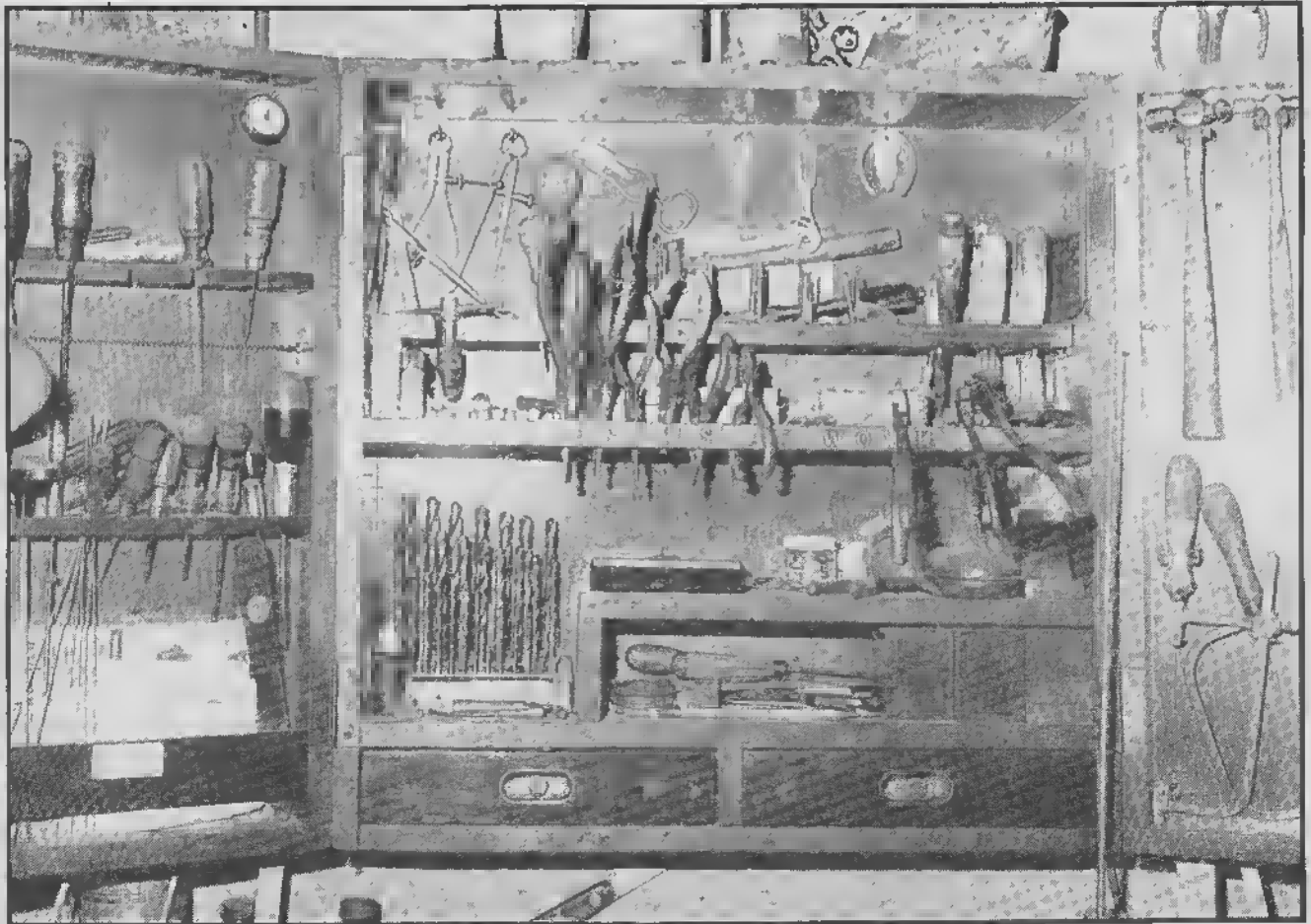
Tools which see much daily use should be located in an open-faced cabinet directly over the workbench. These might include several sizes of screwdrivers, long-nosed pliers, a few Swiss needle files, some pin punches, a small assortment of chisels, diagonal cutters, jeweler's saw and other needs. The craftsman soon will discover just what tools he will be using the most everyday and will want these within arm's reach at all times. The bulk of your gunsmithing tools should be carefully stored in toolboxes, machinist's chests or roll-away tool chests, but these always should be in close proximity to the workbench where they will be handy.

Perhaps the most used — and often abused — tools in a gunshop are files. To prevent files from becoming dull or rusted, a special rack should be installed on the workbench with each file separated from the others by a wood partition. A series of quarter-inch slots cut to a depth of about 1½ inches in the rack generally will accommodate the majority of the larger files. The smaller types, such as Swiss needle files, screw-slot files, extra-fine rounds and slotting files, as well as most of the so-called micro files should be kept in cellulastic tubes and stored in the tool chest. These files invariably are expensive and somewhat delicate, so extra care should be taken to preserve them.

Should you have a bench grinder, this should be mounted on the end of the workbench most distant from the bench vise. In other words, the vise is on one end of the bench, the grinder on the other.

Beneath the workbench, there should be sufficient extra storage space, especially if one installs a couple of shelves

An assortment of the tools used most on a daily basis should be located directly over workbench in cabinet.



on the bench's leg braces. Such shelves also will increase the bench's stability. This area is excellent for storing such items as buffing compounds, buffing wheels, extra sanding paper or any other items that do not fit easily into your toolboxes.

Good lighting is an absolute must for good work, so a two- or three-tube fluorescent lighting system should be

installed over the workbench. If possible, install one of the fixtures that is four feet in length. It will save your eyes to say nothing of assuring that your work is as good as you can do. As a rule, poor lighting usually results in somewhat rough work! However, in lieu of the fluorescent lights, a couple of shaded lamps should suffice. In my own shop, I use both.

Small tools, such as these screw-slot files are stored in plastic tubes to protect them, as well as other tools, from damage through rubbing contact.



On the back wall, near or over the workbench, it is wise to have at least a couple of plug-in light sockets in case you might need to use such items as the Dremel Moto-Tool, an electric soldering iron or an electric drill motor. An electric heater in the cold of winter is also useful!

Fully realizing that each individual will have his own ideas as to just how he wants his shop laid out, this chapter is written primarily for the benefit of those who just don't know where to start in arranging some place to conduct their gun work. It doesn't have to be fancy or elaborate, but make it comfortable, build it solidly and arrange it so you don't have to wear out your eyeballs trying to find something. To repeat an old cliché, have a place for everything and everything in its place. Arrange the drawers of your tool chests so that each contains a specific type tool or its close counterpart. Thus drills, taps and dies should be in one drawer, with nothing but mathematical precision instruments in another and so on.

A suitable place to work is ideal. However, I remember that many years ago, I had just sold my gunshop and, living far out in the hills as we did, I did not have any place to work except in a cold barn. A beat-up workbench that surely was a hundred years old and plenty rickety was the best I had in the beginning. In spite of this primary drawback, I still proceeded to build both a percussion rifle and pistol that turned out to be great shooters. This was accomplished in spite of the fact that I did it with no power tools, was quartered in a leaky barn and had to put up with that rickety workbench.

I still have those two guns and think of them and their origin every time I hear some would-be craftsman belly-aching about his lack of a plush workshop. The tools are inanimate things, they have no brains, feelings or sense of direction. All it takes to make them perform sometime miracles is to place them in the hands of a person with creative instincts; in short, a craftsman!

Extra drills, taps and dies deserve special treatment. These have been stored in a compartmented plastic case. Even with this protection, the special carbide drills and gun taps have been stored in their own plastic tubes.

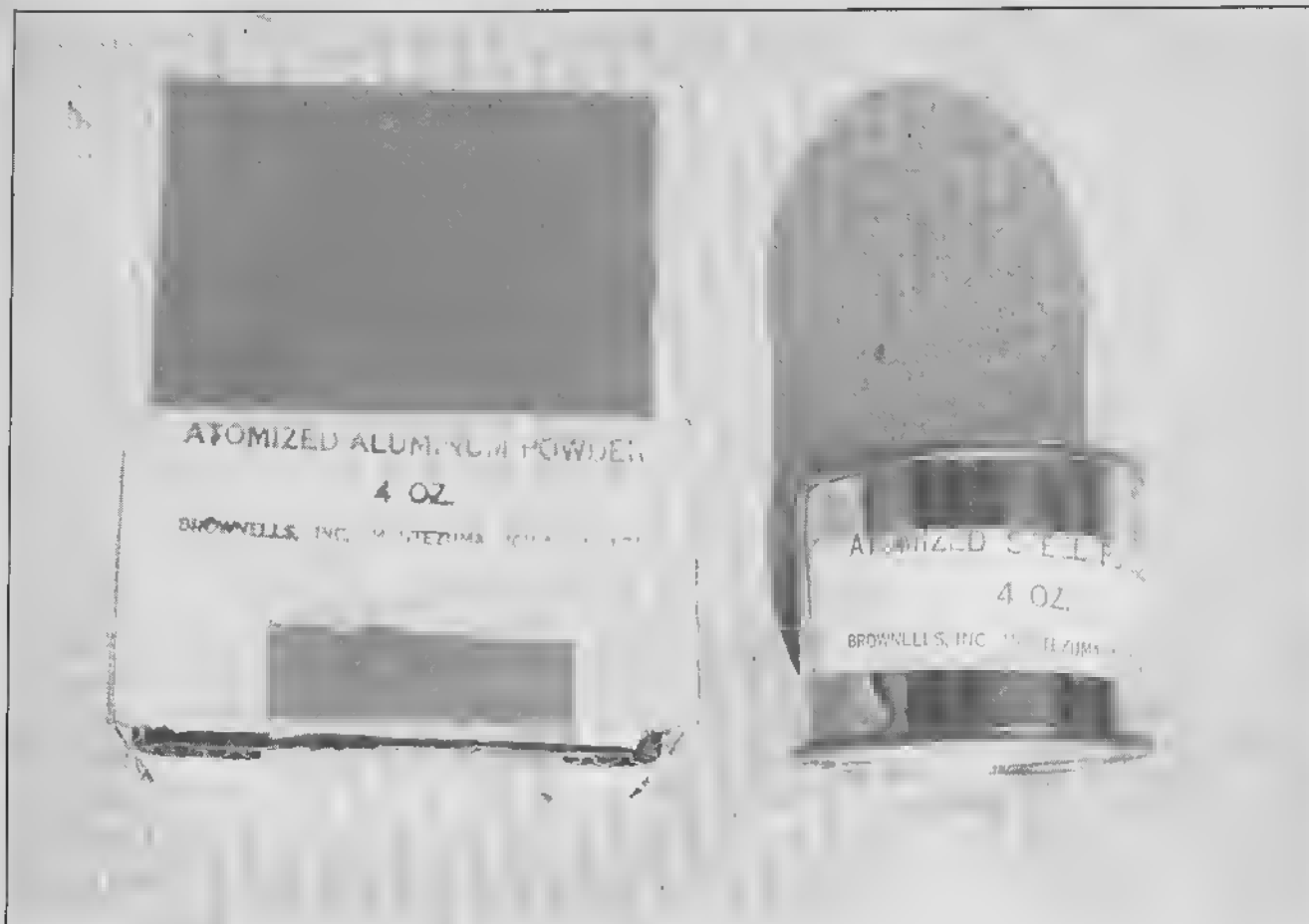


Chapter 5

EPOXIES, GLUES & FILLERS

*A Host Of New Materials Make Gunsmithing
Chores Easier And Cleaner Than They Once Were*





Left: Though in poor condition and badly cracked, the stock of this ancient flintlock can be restored with some carefully fitted inlays to replace the missing wood, then epoxied in place. This particular gun is not considered a valuable collector item, but would make an excellent gun to hang on a wall in a den for purposes of decoration. (Above) To increase the strength of certain types of epoxies, atomized aluminum or steel powder can be added.

PROFESSIONAL gunsmiths experience a continuing stream of broken, cracked, splintered, dinged, deeply scratched, dented and otherwise mutilated wood coming through the doors of their shops. This need for repair is an almost daily happening.

In past years, repairs of this type were considered a headache by the working gunsmith, because a broken or cracked stock could not be guaranteed when repaired. The animal glues then available — even with the installation of wood or metal reinforcing pins — were no assurance that the break would hold should the rifle or shotgun receive a good, sharp jolt. However, this problem has changed for the better. Today, any competent gunsmith can assure a

customer that a cracked or even broken stock, when repaired correctly, will be as good as new. In fact, if really properly done, the break probably will be the strongest part of the stock. This is due to modern technology and developments.

The introduction of so-called miracle glues, epoxies and Space Age cements has virtually revolutionized the gunsmithing industry, making what used to be tough jobs a lot easier for most of us.

There are gunsmiths who do not remember when such miracle preparations were but a dream. Relatively new to the craft, they tend to assume that these iron-strong epoxies, glues and cements have always been with us. In reality, these seemingly miracle cements have been on the scene



The right grip of this Marble Gamegetter had a large piece missing. It was restored, using AcraGlass Gel that was mixed with epoxy black pigment. Great care was required in the repair, but the end result made the repair invisible.

for less than thirty years. I can't recall hearing of or seeing any of these preparations that were available to the general public even in the 1950s.

The uses to which modern epoxies can be applied is limited only to the extent of our imaginations. As for myself, I have performed what to me were tasks verging on miracles. For example, there was a rare pair of hard rubber pistol grips with a large chip knocked out of one corner. With modern epoxies and a bottle of Brownell's epoxy-black pigment, I mixed up a small batch I thought sufficient for the repair. I then constructed a retaining dike around

the broken section of the grip, poured the epoxy into the area and allowed it to harden for twelve hours.

Once hardened, the epoxy was carefully dressed to the original conformation of the pistol grip. Then, just as carefully, I checked the material to blend in with the rest of the grip. These antique pistol grips are virtually impossible to find today, so it was a matter of either leaving the grip broken as it was or attempting to replace the missing section. The epoxy, colored with the black pigment was a perfect match for the original hard rubber and the repair is all but invisible.



Epoxy black pigment, marketed now by Brownell's, Inc., can be mixed with epoxies in minute amounts to produce a jet black finish similar to hard rubber, but the product is stronger.

Colt SAA hard rubber grips of pre-World War II vintage are difficult to find and expensive. This broken grip was repaired to near original shape.

These epoxies and miracle cements are used regularly by gunsmiths to install barrel liners, repair broken or badly cracked stocks and for bedding new barreled actions into rifle stocks.

Probably the best known epoxies for gun work are those supplied by Brownell's of Montezuma, Iowa. The first of these — and possibly the best known — is AcraGlas stock bedding compound. This product has been highly praised by gunsmiths over the years of its existence and is probably today's most extensively used stock bedding compound. Like many epoxies, AcraGlas is absolutely acid and water-proof, it will not rot or deteriorate as will some so-called plastic glasses. It is highly resistant to impact, will not



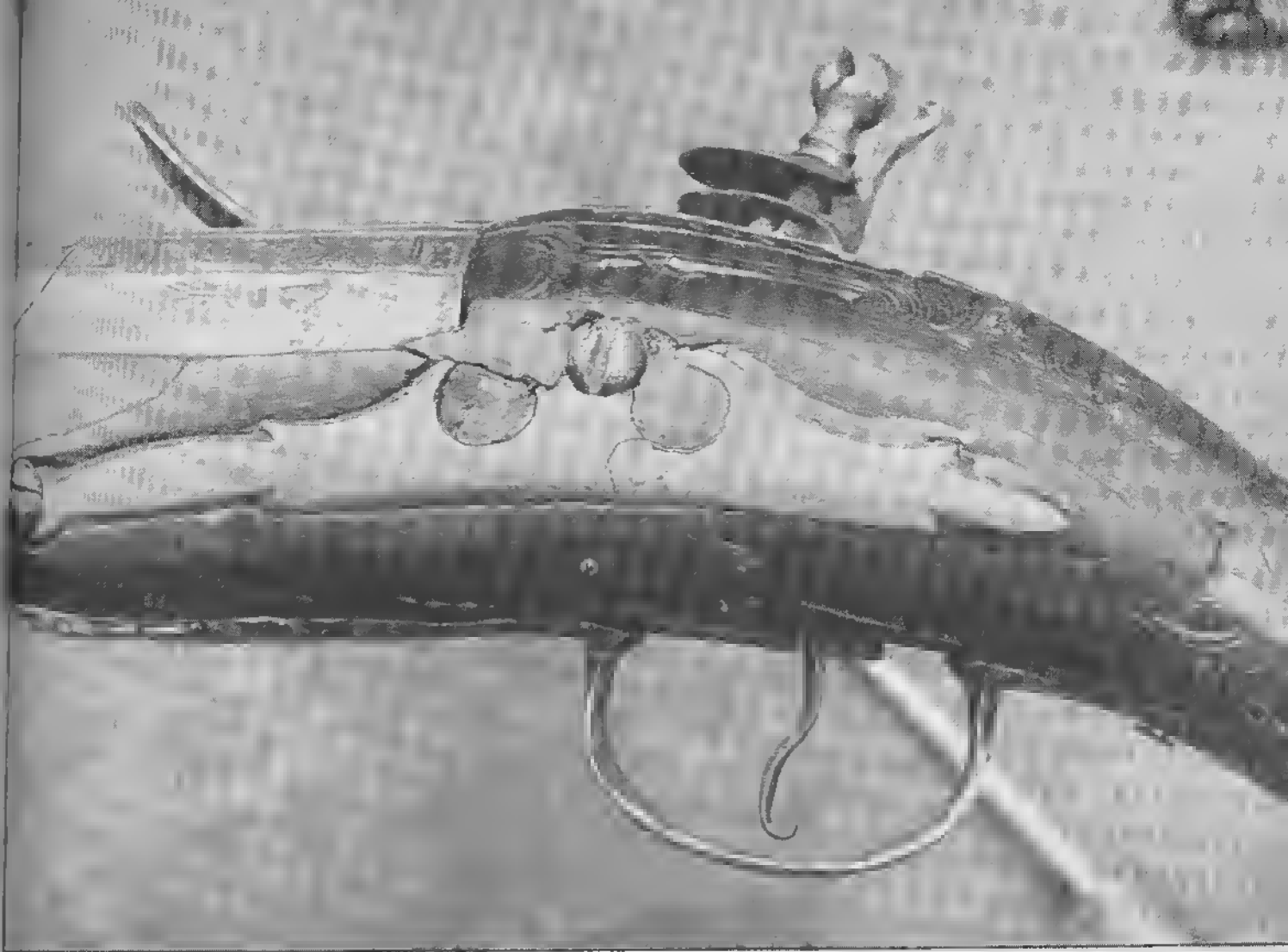


Author feels that AcraGlas Gel and AcraGlas are without equal when it comes to repairing or bedding gun stocks. He feels AcraWeld is outstanding for badly cracked stocks. (Right) Most epoxies must be mixed on a one-to-one basis — equal parts of the two substances — and should be mixed thoroughly to assure proper bond in mending jobs.

dent, is easily repaired, has a shrinkage factor of less than one percent and will bond permanently to any wood or metal if a releasing agent is not used. It hardens by chemical action only.

A companion to AcraGlas is AcraGlas Gel. Also a product of Brownell's, this newer version has a nylon-epoxy base. It may be mixed with atomized aluminum or steel dust for true super strength and holding power. This product is the result of the latest in technological research and has a shrinkage of only one-tenth of one percent, amazing in itself.





Bad cracks and gouges such as those on this 18th Century flintlock pistol can be repaired with epoxies. If the job is done correctly, Bish declares, the repaired area may well prove to be the strongest part of the entire gun stock.

When a cracked or broken rifle stock is repaired properly with this product, one may rest assured that this repair is the strongest part of the stock. The original break will never break again! AcraGlas Gel is easily mixed one-for-one — equal parts from each of the two containers — and has a butter-smooth consistency which will not run or drip from the area where applied.

Yet another superlative Brownell's product is Acra-Weld. If you want something glued permanently, Acra-Weld is the answer. However, never allow it to touch

anything you don't want cemented, because it will adhere permanently to whatever it touches. You would look a bit odd with your finger permanently affixed to your ear!

In the past I have used both AcraGlas and Acra-Weld for stock cracks and breaks, but now favor Acra-Weld exclusively for these chores. It has a longer set-up time — about twelve hours — but is more versatile in that it may be used on metal, wood, concrete, ceramics, glass and I even used it to repair several small leaks in my fishing boat successfully and permanently.

Such preparations also are a godsend for antique arms restoration. In many cases, the wood of four-hundred-year-old arms has become quite pulpy and is fragile to handle. On the verge of disintegration as it is, this wood can be given new life by carefully applying a coating of any of the mentioned epoxies to the surface. When the epoxy has hardened, the wood usually can be restored to its original contours. Missing or chipped sections of wood can be replaced by carefully shaping a new piece of the proper type wood to fit the void, then epoxying it into place. Properly done, a repair such as this is virtually undetectable even to the practiced eye.

Years ago, one of the most often used adhesives for wood repair was simple rosin. When melted, rosin becomes fluid and may be poured or smoothed onto any wood surface to fill gouges or dents. When cool, the rosin will solidify and thus could be sanded and shaped. A final coating of varnish would bind the rosin repair in place. Rosin also was used for several centuries by the cutlers of

Sheffield, England. Its use was limited largely to attaching knife handles to the blades of so-called Bowie-type knives as well as table and carving knives. Since the advent of modern epoxies, the use of natural rosins has been largely curtailed.

What are termed fillers are used for repairing deep scratches and dents in gun stocks. The old standby is known as a shellac stick. Available in a wide variety of colors, shellac from these sticks is applied to the dented or gouged area with a small spatula in a quick, sweeping motion after a portion of the stick has been melted by heat. Application of this product is a matter of experimentation to attain the correct color. It is not recommended for the rank amateur until there has been a lot of practice in its proper use.

Then there are the quick-dry cements that set up hard in a matter of seconds. These so-called miracle products were developed in recent years for medical use after it was found the cement would adhere to human flesh and stick it

The handle of this rare Marble #2 safety pocket ax was broken away for about half its length. Careful application of AcraGlas Gel, mixed with epoxy black pigment, resulted in restoration. The original handle was of hard rubber.



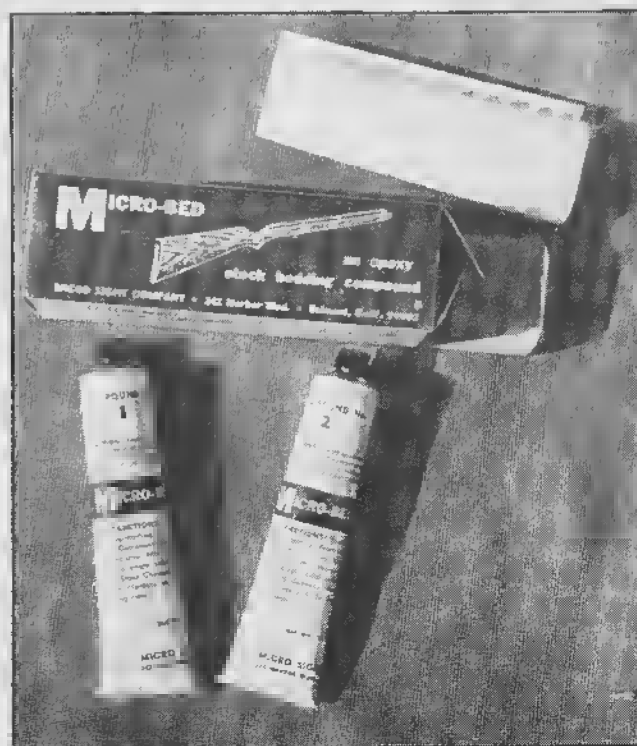


Above: Shellac sticks are available in a variety of colors. Properly used, these sticks can be used to make invisible repairs on dents, scratches, gouges and even deep tool marks in gun stocks or pistol grips. (Below) Micro-bed is another of the epoxy based compounds that Bish has found satisfactory for rifle bedding and general stock repair.

together tight! I can attest to this claim. On several occasions, when I first used the material, I had several fingers seemingly bonded together permanently! Not even lacquer thinner would affect it, but a good soaking in hot water and scrubbing with Lava soap finally broke the stuff loose.

While not particularly suited to gunsmithing projects, these quick-set cements do have their place in the field. I never think of going hunting or fishing without a small bottle of this quick-setting material. It's great for quick repairs to a fishing rod and a small single drop will tighten up a loose sight or scope mount in a matter of seconds. It also is great for securing a knot on a lure or fly you have just tied to your fishing line. It's a quick way of mending something temporarily, but it is not necessarily permanent.

Amateur and professional gun craftsmen alike will be using literally gallons of the aforementioned epoxies, until scientists come up with something even better. Until that time comes, epoxies are the great time-savers and headache preventatives in the field of gun crafting.



Chapter 6

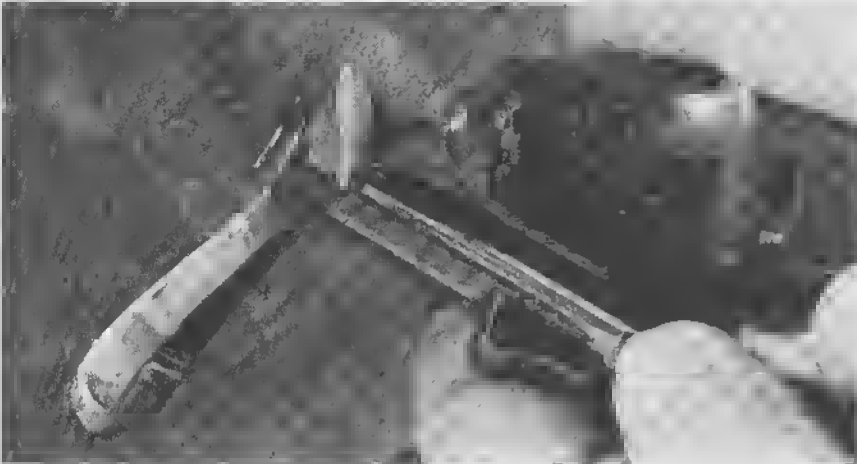
TINY TOOLS FOR GUNSMITHS

*The Dremel Moto-Tool Does Dozens Of
Jobs In Minutes — Not Hours!*





Using the Dremel Moto-Tool, the inner surfaces of a trigger guard can be polished quickly and efficiently. If reshaping is required, this can be done best with use of sander, buffer.



Newly welded custom bolt handles are smoothed up easily, when polished with minute stones at 30,000 rpm.

MOST GUNSMITHS, whether professionals or neophytes will concede that the bench vise is the most used piece of equipment in their shops. Though the bench vise is invaluable, it also can ruin fine guns or such articles as gunstocks, unless the steel jaws are padded with removable cork, lead or brass jaw plates to prevent marring surfaces being worked on.

Running second to the bench vise possibly would be the drill press and the lathe as those used most.

But, the vise, doing its thing of holding various gun components between its hardened steel jaws, contributes little else. Each gun component, whether lock, stock or barrel is placed in the vise jaws for the sole purpose of having work done on it. This can include file-fitting, smoothing up, minor or major alterations such as grinding, polishing, routing, deburring, shaping or carving and the million and one other little chores that go into building or customizing any rifle, pistol or shotgun.

With the gun part clamped in the vise jaws, the next consideration is the proper tools to use in finishing the job in a precise manner. It may be a series of hand-held files, crocus cloth or emery paper, a hacksaw or some abrasive substance needed to remove the tough case-hardening. Or the part may need only minor honing.

About thirty-five years ago, I purchased a small, compact electric hand unit known as the Dremel Moto-Tool. In the years that have followed, this little gem has paid for itself over and over again in time saved and the precision work it has performed on rifles, pistols and shotguns that passed through my shop for everything from major rebuilding and customization down to minor repairs. I found that there was little this tiny tool couldn't do in most phases of general gun work, providing the proper accessories were used. Proving that the makers don't believe in fooling with success, the design has changed little over the years.

My original unit is now in worn condition and is using its umpteenth set of replacement armature brushes. Feeling



that it was time to retire this aged work horse, I purchased a new Model 280 (Model 281 in kit form) Dremel Moto-Tool. This unit churns up 30,000 revs per minute, weighs only eleven ounces and its powerful motor won't stall until loaded to sixteen ounce-inches of torque! The complete hand tool, with fitted case, contains twenty-three useful accessories and operates on 110-volt current.

While the Dremel tool is not intended for the heavy cutting, polishing or routing applicable to heavier bench-mounted equipment, it still will prove its worth to the gun mechanic on such precision chores as final stock and action bedding, bolt and trigger alterations, precision grinding on small parts and in removing case-hardening from rifle receivers prior to drilling for scope mounts. It also is used for such precise work as opening up guide rails in rifle receivers to accept larger magnum cartridges, inlay work, trigger guard polishing and reshaping, honing and action polishing and carving. But for all-around precision workmanship, the operator must understand its capabilities and limitations.

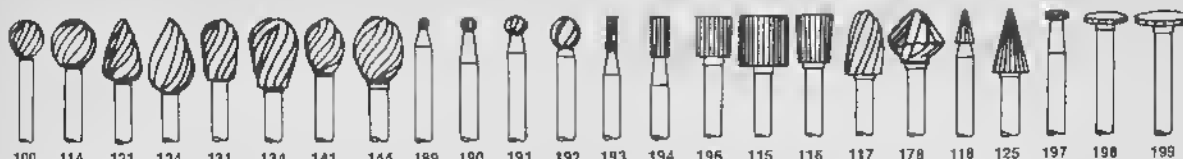
Available for this tool are various sizes and shapes of emery and abrasive wheels, cut-off wheels, engraving cutters, steel burrs, felt and cloth buffing and polishing wheels, mandrels, drum sanders, rotary brushes in both wire and bristle, emery points, rubberized polishing and honing wheels, steel saws, carbide cutters in five shapes and various other accessories. All are invaluable in general gun craftsmanship.

Above: Polishing flutes in a revolver cylinder is done easily with a small felt buffer that is furnished with the kit. (Below) With the aid of the small wire wheel, rust is removed from sights, trigger assemblies, chambers.



High Speed Cutters

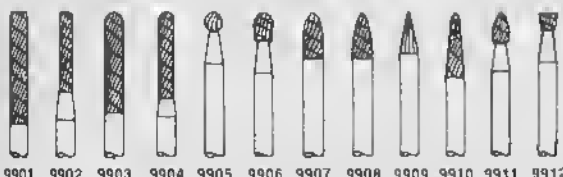
Made of high quality steel. All have $\frac{1}{8}$ " shanks. Can be used for shaping, hollowing most metals, plastics and woods.



Do not run accessories in excess of 30,000 RPM

Tungsten Carbide Cutters

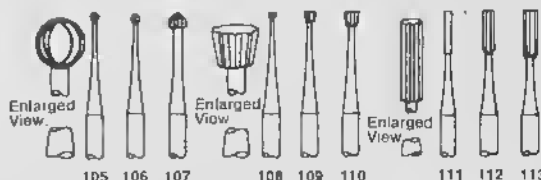
Carbide cutters outlast high speed cutters many times over. $\frac{1}{8}$ " shanks with maximum cutting head of $\frac{1}{8}$ ".



Do not run accessories in excess of 30,000 RPM

Small Engraving Cutters

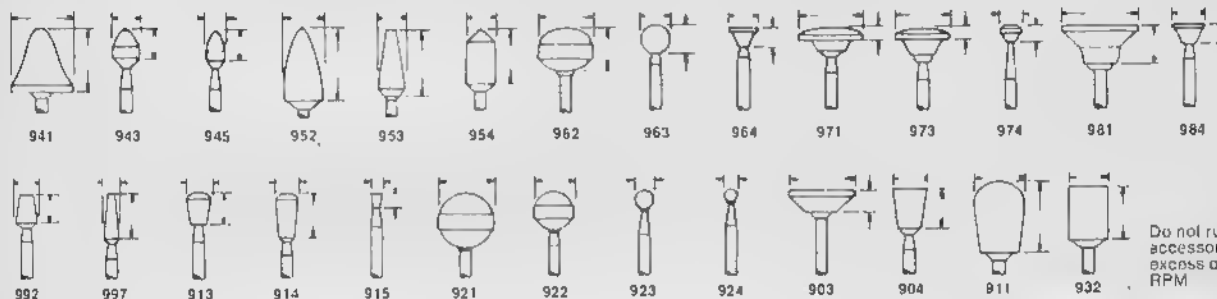
Ideal for engraving, carving, routing in wood, fiber, plastic and soft metals — everything except hardened materials $\frac{3}{32}$ " shanks only.



Do not run accessories in excess of 30,000 RPM

Mounted Aluminum Oxide Wheel Points

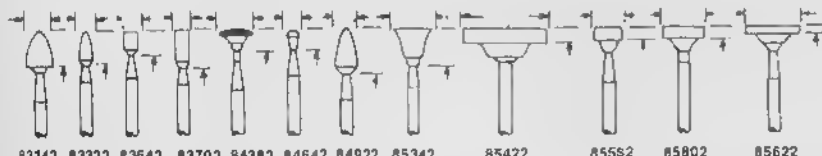
Highest industrial quality with long abrasive life. $\frac{1}{8}$ " shanks. Ideal for sharpening, deburring and general purpose grinding.



Do not run accessories in excess of 30,000 RPM

Silicon Grinding Points

Made especially for grinding on hard steel, ceramics, glass and other hard materials. $\frac{1}{8}$ " shanks.



Do not run accessories in excess of 30,000 RPM

Plain Shaped Aluminum Oxide Wheel Points

Ideal for sharpening, deburring and general purpose grinding. All have $\frac{1}{8}$ " shanks.

No.	Dia.	Thickness	No.	Dia.	Thickness
8153	3/16"	3/8"	8175	3/8"	3/8"
8160	1/4"	1/4"	8184	1/2"	3/8"
8162	1/4"	3/8"	8193	5/8"	3/8"
8163	1/4"	1/2"	8200	3/4"	1/8"
8173	3/8"	1/8"	8202	3/4"	3/8"
8174	3/8"	1/4"	8215	1"	1/8"



Do not run accessories in excess of 30,000 RPM

Sanding Accessories

Drum Sander
No. 407

Drum Sander
Bands No. 408,
No. 432

Sanding Discs. No. 411,
No. 412, No. 413



No. 407 Ideal for rough sanding wood and smoothing fiberglass. Sander bands are replaceable and available in 1/2" size. Comes with one band. 1/8" shank.

No. 408 1/2" dia. Coarse Grit Sander Band.

No. 432 1/2" dia. Fine Grit Sander Band



No. 411 $\frac{3}{4}$ " dia. Coarse Grit Sanding Discs (Use w/Mandrel No. 402).
No. 412 $\frac{3}{4}$ " dia. Medium Grit Sanding Discs (Use w/Mandrel No. 402).
No. 413 $\frac{3}{4}$ " dia. Fine Grit Sanding Discs (Use w/Mandrel No. 402).

Brush Accessories

Wire Brushes



428



442



443

Bristle Brushes



403



404



405

Nos. *428, *442, *443 Small, versatile steel brushes for efficiently removing rust and corrosion, polishing metal surfaces. 1/8" shanks.

(Do not run in excess of 15,000 RPM)

Nos. 403, 404, 405 For cleaning and polishing silverware, jewelry and metal surfaces. Ideal for hard to reach places. 1/8" shanks.

DREMEL ACCESSORIES

Interchangeable chuck collets ranging from 1/32- up to 1/8-inch are furnished with each kit. These collets will accept any cutting and abrasive tools designed for hand-held rotary tools such as the Dremel. All are of tool steel.

Some years ago, while building my first magnum conversion from a standard Model 98 Mauser action, I had the rifle almost finished. The bolt had been opened up to accept the larger head diameter of the magnum case, the stock was finished, except for checkering, and even the extractor had been reshaped accordingly.

The problem facing me was the exacting chore of opening up the guide rails in the receiver to allow smooth feeding of the larger cartridges into the chamber. Up to this point, I never had encountered a situation just like this. How and in what way was I to go about refacing these rails to assure that the cartridges would feed properly?

After due consideration, I chucked a rounded half-inch abrasive wheel into the tool's collet and went to work. I soon had the new rifle feeding belted magnum rounds as smooth as silk into the chamber of the rifle. This was the



Bolt handle slots and similar inletting jobs are done easily and quickly with steel burrs of the appropriate size and shape. The manufacturer offers a wide variety.



Ivory or rare wood pistol grips can be carved in a variety of patterns with the tiny steel burrs. Bish puts the finishing touches to a skull carved into the ivory.



Author has found that he can use this tool to fit grips to automatic, revolver frames, using circular emery discs.

first time I had used such a tool on what I consider a highly crucial bit of gun work. A sloppy or haphazard job could have turned the entire receiver into scrap iron!

Reshaping and polishing such components as trigger guards, bolt sleeves, flutes in revolver cylinders, altering rifle receivers to accept custom triggers with thumb safeties, broken screw removal, sight alterations and milling mortises in stocks for custom triggers are some of the uses I've found. Polishing and sharpening small tools, such as inletting chisels, and polishing in hard-to-get-at places prior to final bluing are within the capabilities of this type of tool. With its high speed motor and the correct acces-

sory chucked tightly in the collet, it is fully capable of working in places where it would be impossible to accomplish anything with hand-held, non-power tools.

I have bottomed out mortises to accept gold, silver or ivory inlays in stocks and to precision-fit forend tips and custom pistol grip caps, but to attempt removal of large quantities of steel, such as milling the ears off an Enfield rifle, would be fruitless. It could be done, possibly in a period of weeks or months, but such jobs as this are best left to heavy duty grinders or milling machines.

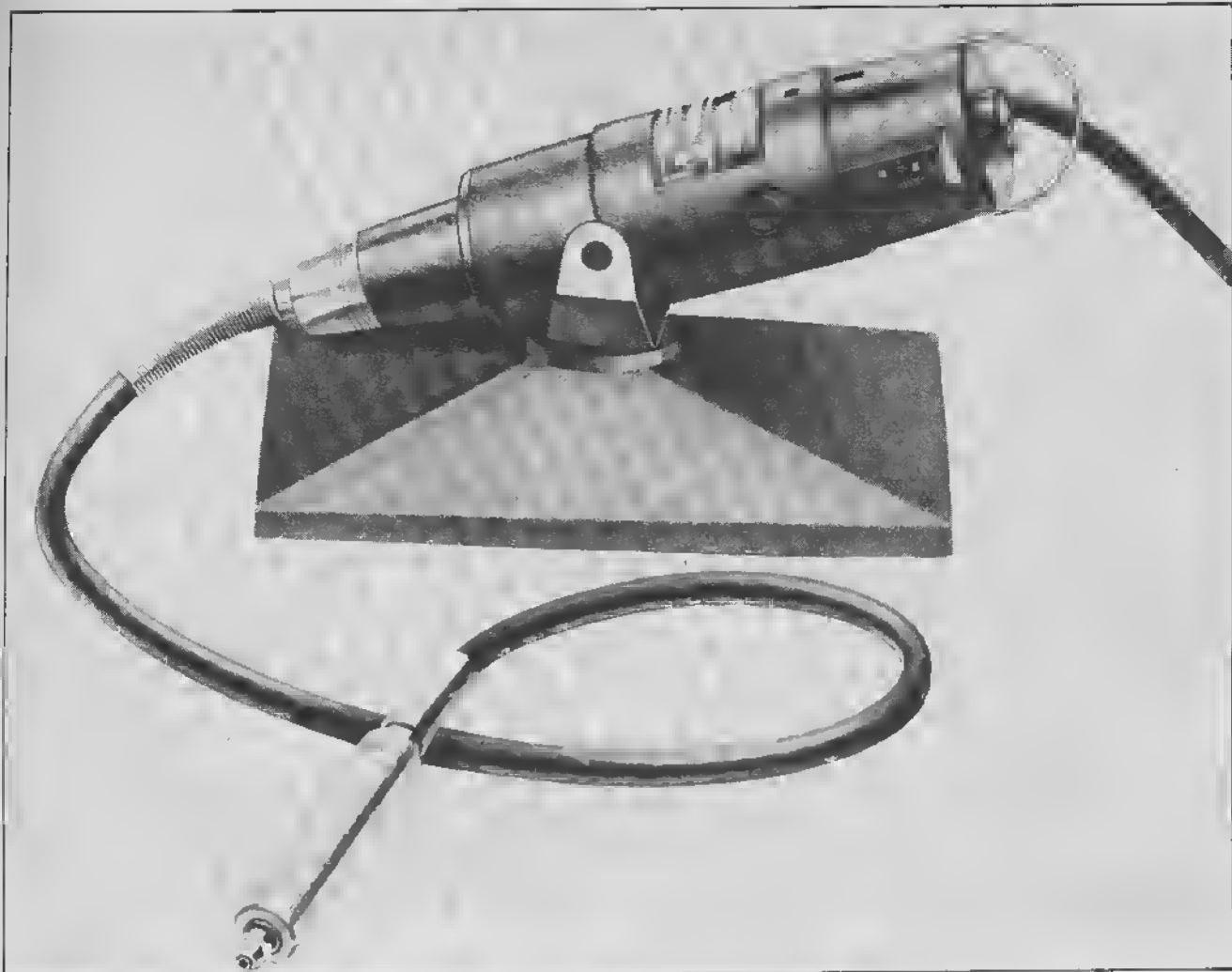
For those building replica antique firearms or repairing old originals, the tool can be invaluable for inletting com-



The author has used this particular unit for more than a dozen years for a variety of chores.

plicated mortises to accept both back action and bar-type locks. Building and restoring antique arms, from the matchlock on through the many and varied types of wheellocks, flintlocks and percussions requires such chores as inletting locks and triggers, cutting barrel key slots, inletting the sometimes complex designs in aged trigger guards and butt plates and repairing and smoothing up of the locks themselves.

On numerous occasions I have constructed, from both cold-rolled and tempered tool steel, complete flint and percussion locks for shooting replicas of antique rifles and pistols. Had it not been for such a tool, my work time on these guns would have been extended by many days, if not weeks, in cutting, milling and shaping parts as the hammers, frizzens, yokes and stirrups, side plates and other complicated parts.



The Motoflex Model 332 V.S. has undergone few changes over years. (Left) Current model has solid-state variable speed control as well as override power switch.

Chapter 7

COLORING & FILLING GUN WOODS

*Modern Preparations Make This Chore More Simple
But No Less Demanding Than In The Past*



Available in five colors, these stock dyes are capable of producing nearly any shade of color desired in a gun stock or pistol grip, ranging from a rich red to jet black. Portions may be mixed to attain the shade that is desired.

PREPARING A rifle stock or wooden pistol grips for final finishing requires far more than simply sanding and applying the final liquid stock finish. All too frequently, I have observed gun wood that some proud owner had finished himself to make it appear as though he had sanded the stock with coarse river gravel, then had applied cheap varnish with a broom!

This may sound a little far-fetched but it is true. Most of us, at one time or another, have seen otherwise beautiful stock wood that had been literally ruined during the finishing process with cheap sandpapers and varnish or lacquer unsuited for the purpose.

Finishing a rifle or shotgun stock or a set of pistol-grips made from an exotic wood into something one can be proud of requires thoughtful, diligent work. Once the wood is fully shaped and properly sanded to velvet smoothness, the real chore, of producing a piece of wood in which the beauty of the grain is fully accentuated, begins.

First, the wood itself must be taken into consideration. Does it have a porous surface? Does it have nice texture and an attractive grain? How about the color of the wood? Is it pleasing to look at or does it have a drab, dead appearance? All of these questions must be taken into consideration before any preparation is applied to the wood's surface.



To determine how the grain of a stock will look after the application of finishing oil, the author lightly swabs the raw surface of the wood with a coating of pure lacquer thinner. This shows the true beauty of the grain and helps determine whether it should undergo slight tinting with the dyes. Light swabbing with water will do the same job.



Stock sealers, fillers and finishes made by such firms as Birchwood-Casey, Dem-Bart, Lyman and others produce excellent finishes on gun wood if the directions are followed to letter. They are available in most gunshops.



Birchwood-Casey offers a complete stock-finishing kit that includes all components needed. Kits of this type are used daily by most modern gunsmiths and gun stock specialists.

Assuming a rifle stock has been given its final sanding, one wants to determine just how the coloring and grain will appear when the liquid stock preparations are applied. I long ago learned that by applying a small amount of lacquer thinner to the surface of the glassy-smooth wood, one can see immediately exactly how the surface will look when a clear stock finish such as Tru-Oil is applied.

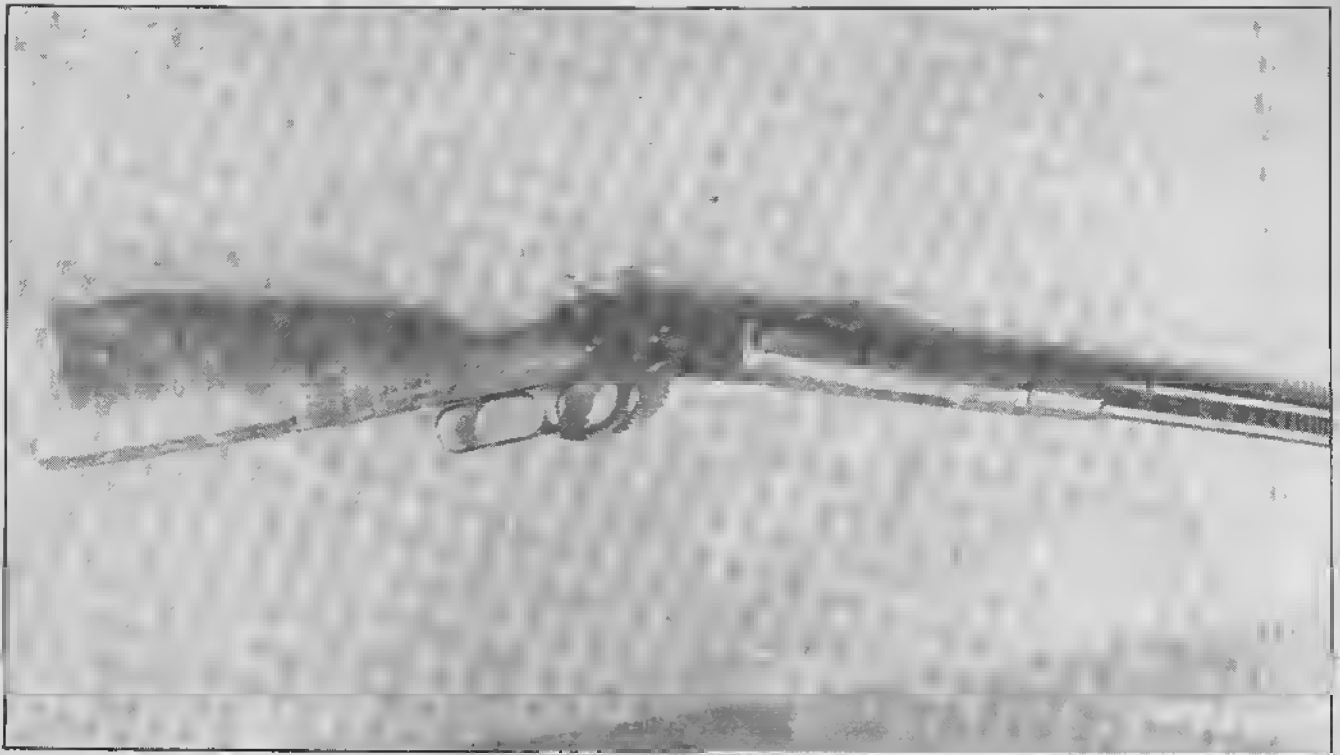
Should the wood appear too light in color, with little or no grain or mottling to result in that drab look, a coloring agent is needed to bring out or accentuate the beauty of any existing coloration the wood might have. Should the wood be too dark, then another dye might be used to make the wood's surface appear lighter.

Brownell's water-soluble stock dyes are available in five colors, Orange Concentrate II, Resorcin Brown 5-C, Ni-grosine WSB, Scarlet NS and Tartrazine (yellow). These are highly concentrated stains that I have found to be more permanent than are oil stains. Each bottle of stain may be used individually or blended with any of the others to produce the specific color desired for various woods. Full instructions are on each bottle.

These dyes are unsurpassed for darkening maple or for lightening dark walnut. In combination, they are capable of giving the craftsman exactly the color he wants to any stock woods, from a dark, almost ebony look, to the dark rich reds found only on the finest gun stocks. The proper use of these dyes can make a cheap piece of walnut look like an expensive piece of wood.

In using these dyes, one will note that the water base will have a tendency to raise the grain. This grain must be sanded smooth, using an extra-fine garnet paper. Allow the dye to dry thoroughly to determine the exact color it produces. As a rule, the more coatings applied, the darker will be the final coloration. Using these dyes requires a certain amount of experimentation until the right color is attained. Each piece of stock wood will create slightly different problems due to the texture of the wood. Like so many phases in gunsmithing, it is a matter of trial-and-error experimentation until total satisfaction is achieved.

Any number of superb stock finishing preparations are available to the home gunsmith or bobbiest. For the most part, these are the same preparations used by professional



Aged and obsolete rifles and carbines can be restored by complete relintshing or replacement of the wood. This Model 1892 Winchester carbine had been give a new Fajen stock and forearm by the author and the metal reblued. The highly figured grain in both pieces of walnut has been brought out by application of Tru-Oil to wood. (Below) The photo does not do justice to the glass smooth surface and exceptionally fine grain in this custom-built rifle stock. Hand-finished with Tru-Oil, the stock still retains its beauty despite many tough hunt trips.





Being applied by hand by the author, the stock filler will seal and fill all objectionable pores in the wood. This, in turn, will lead to the perfect glass like surface that is attained when finishing oil is applied to the stock.

gunsmiths. However, there will always be those who will go to the local paint store for a can of floor varnish to apply to a freshly sanded gun stock. One who is serious about his work should stick to finishes developed specifically for gun woods.

Available at most gun shops of any size are the stock finishing preparations produced by Birchwood-Casey, Dem-Bart, Lin-Speed and several other manufacturers. As a rule, these finishes and fillers are available in 2½-ounce bottles and are sufficient for several full rifle stocks or dozens of pistol grips. Also available are complete finishing kits that include all of the needed materials to finish several stocks. These kits provide fillers, oils, applicators, several grades of sandpaper and steel wool as well as service and polish cloths.

When a stock is fully sanded, the wood has a pleasing coloration and is ready for final finishing, the next need is a stock filler. This compound will fill the minute pores in the wood and prepare the surface for the final oil finish. This filler is applied with a soft cloth, rubbing both lengthwise and crossgrain. Make certain that the entire outer surface

of the stock is well covered and the filler fully rubbed into the grain. Allow the filler to dry for several hours, then with a soft cloth, carefully remove the excess filler. This is done by rubbing across the grain so as to not disturb the filler that adheres to the pores of the wood. Remove all of the filler adhering to the surface of the wood only, but do not overrub; this will only remove the filler from the pores of the wood defeating the purpose.

After a thorough coating, the filler is allowed to dry for several hours, then should be buffed lightly by hand with a soft cloth. The stock is now ready for the final finish: application of the stock oil.

At this point, make absolutely certain that there is no wood dust from sanding in the air or in the vicinity where the oil is to be applied. This can make all the difference in whether the dried finish will be glassy smooth or ends up with a surface covered with minute bumps.

Two methods may be used to apply the oil finish. Birchwood-Casey produces an aerosol spray solely for stock finishing which contains Tru-Oil or the Tru-Oil may be applied with the fingers directly from the bottle. Regard-

less of which method is favored, a perfect finish is possible if care is taken to apply the oil in extremely thin coatings, allowing each to dry thoroughly before the next application. One should allow at least twenty-four hours for thorough drying at seventy degrees following the final coating. Then the entire surface can be treated lightly with stock rubbing compound followed by a coat of wax.

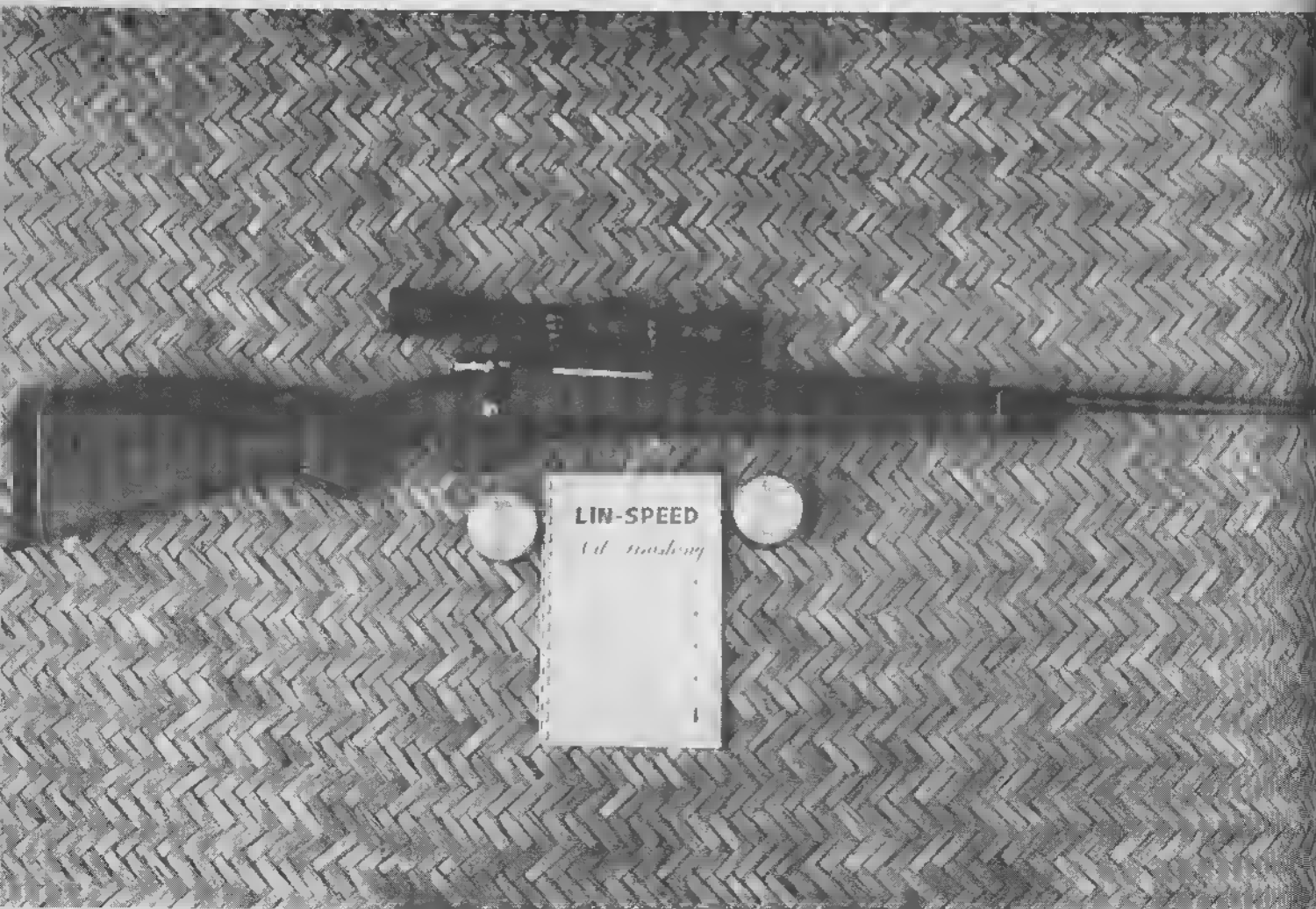
Refinishing or rejuvenation of an older stock follows the same basic procedure as for a new stock. However, if the older stock is badly scratched or marred, it must be sanded thoroughly and existing dents or dings removed by steaming. Provided the surface has only minor scratches, an older stock may be brought back to almost new appearance by thoroughly rubbing the surface with stock rubbing compound in some cases. This usually will remove minor scratches and discoloring dirt which might be on the surface. Again, waxing following use of the rubbing com-

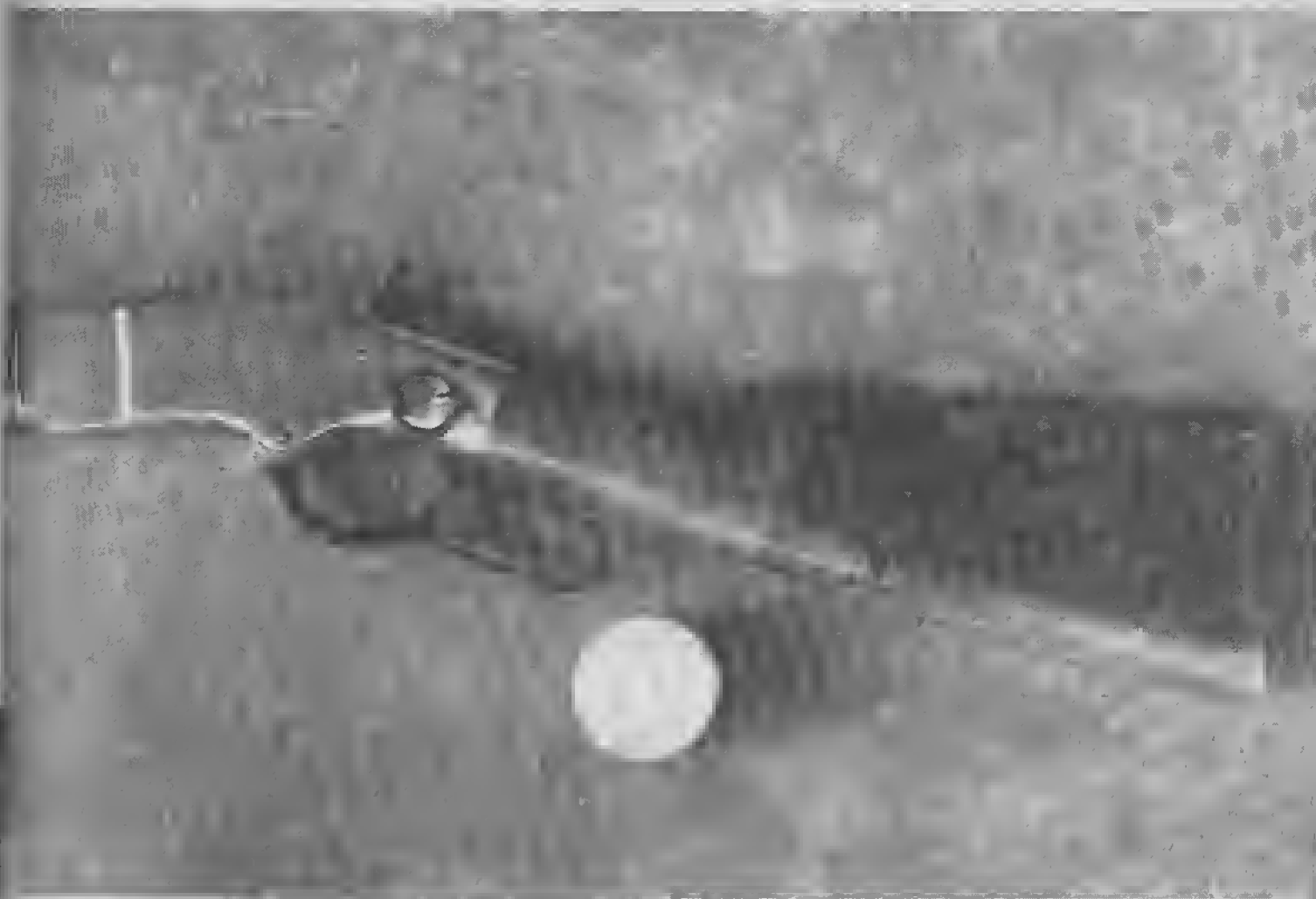
pound usually will turn an otherwise drab-looking old stock into one of beauty.

The secret of stock finishing — other than proper sanding — lies in allowing the final finish sufficient drying time. In too many cases, the finish is not allowed time to set up and dry hard before the rubbing compound is used. When this occurs, the finish usually is so poor that a thorough sanding again is necessary.

As in most professions, there are countless little tricks of the trade in gunsmithing. One that I discovered for myself some years ago was that some advertisements can be fact instead of fiction. On the bottle of Tru-Oil is the printed statement that "the filler is in the finish." Somewhat dubious at the time, I tried straight Tru-Oil on a piece of raw walnut, flowing it on smoothing and thinly. Sure enough, the pores of the wood were filled completely with just two thin coatings of the oil. No filler was used whatsoever. The

Mauser rifle with its tiger-striped stock was finished with Lin-Speed stock finishing oil to produce a tough, scratch-resistant surface and greatly enhance the grain of the wood. Lin-Speed and Tru-Oil are gunsmiths' favorites.





Stock and forearm of this Model 1866 Winchester carbine were relinished with careful sanding, filling, then an application of Lin-Speed stock finishing oil. Note the outstanding grain configuration brought out by the treatment.

same results can be duplicated, I found, with Lin-Speed oil stock finish. I have used both for years and never have found fault with either.

Prior to the introduction of the superlative stock finishes and preparations available to the gun enthusiast today, it was necessary for the gun craftsman to concoct his own brews of stock oils and finishes. A gunstock sometimes took weeks and even months to attain the desired finish with home-brewed oils and countless hours of hand rubbing.

I can remember concocting stock oils by mixing powdered rosin, varnish, shellac, Japan driers and boiled linseed oil, then heating this mixture until the powdered rosin would melt and become fluid. This mixture was applied to the wood as hot as the hands would tolerate, then rubbed in

for hours. The stock then was allowed to sit and dry for at least twelve hours before another coat was applied.

This method often required as many as twelve coats in order to produce an almost rock-hard durable finish and could take as much as a month of hard work. Today the same results can be attained in only a few hours with modern preparations. The modern gunsmith never had it so good!

Another secret to good stock finishing is patience. Never rush any phase of this job. Be sure the stock is thoroughly and properly sanded to a satiny finish. As suggested, apply the final finishing oils in a dust-free area, then allow to dry for at least a day. You only want to do this job once. Try for perfection the first time. If you attempt to rush the effort, you are looking forward to a complete resanding of the stock.

Chapter 8

USE YOUR IRON

*It Doesn't Require A Gunsmith To Install A
See-Through Scope Mount For Double Aiming Duty*

Tommy Bish checks out the scope that he has mounted on a see-through scope mount. The mount doesn't interfere.



SEVERAL YEARS ago, I was offered an exceptionally fine Brno carbine on a trade I couldn't turn down. This carbine was equipped with a full Mannlicher-type stock and was in a caliber that never seems to grow old or lose its popularity, the 7x57 Mauser.

It was equipped with the original scope mounts, which are quite rare in themselves these days. The outstanding feature of these particular mounts was that they incorporated a sighting tunnel that allowed either the scope or the iron sights to be used at the shooter's will. Should the scope become damaged or fogged, the shooter had only to lower his head slightly to have an unobstructed view of the iron sights.

Much has been written over the years concerning the virtues of a sporting rifle being equipped with both scope and iron sights. It is my personal contention that any sporting rifle minus its iron sights isn't a complete rifle, regardless of the quality of the scope! Too often one hears of hunts that have been blown due to a scope becoming either badly bumped, fogged up or put out of use by any number of unforeseen circumstances. Had sights been mounted on

the rifle, the hunt might have continued successfully.

Until recent years — with few exceptions — it was necessary for one to completely remove a damaged scope from the rifle before he could continue his hunt with open iron sights. That, of course, was provided the rifle was equipped with iron sights.

In the majority of cases, it was necessary not only to remove the scope and rings from the rifle, but the scope mounting base had to come off, too. This was necessary for full and clear vision of the open sights. This can be somewhat disconcerting to a hunter who might be miles from base camp, possibly knee-deep in snow and with a choice bull elk, moose or bear practically within his grasp! The scope might be removed from its base with comparative ease, but when it comes to removing those mount base screws, this can be something else! Especially if the hunter is without tools, except for possibly a hunting knife.

I like to feel that a story I did several years ago concerning the unique scope mounts on that little Brno carbine had something to do with several manufacturers seeing the need for such a mount and producing it for American hunters.

The author adjusts his aim to use the see-through mount that allows him to use his iron sights in close shooting.



Until then, a couple of manufacturers were producing a type of mount that allowed the scope to be tipped to one side, thus allowing full use of the rifle's iron sights. To my knowledge the Pachmayr Lo-Swing mount and the Weaver Pivot mount were the pioneers in this field. Later, manufacturers such as Redfield, Williams and Leupold produced mounts with peep-type sights incorporated into the mounting bases themselves. When correctly mounted, adjusted and collimated, these peeps prove their worth at times of scope damage. However, it still was necessary to remove the scope and rings from the base in order to utilize them.

Weaver currently is producing a couple of models of the

see-through mount. One is designed to fit Weaver bases, the other to fit rifles with dovetails milled in the receivers. Too, Redfield and Burris have see-through scope mounts to fit most popular sporting rifles. This selection gives a choice and are all based on the Brno mount.

The first of these see-through mounts came to my attention several years ago. The Ironsighter scope mount is a product of J.B. Holden Company of Plymouth, Michigan. These mounts are the two-piece type and are available for all popular rifle models and even shotguns. Of tough, lightweight aircraft-type alloy, these mounts are guaranteed fully against defects in materials and workmanship. Installation is accomplished with Allen-head screws in

Scopes have become standard on most rifles and this bear was downed with a rifle mounted with one, but, in heavy timber such as that seen in background, close shots often are necessary and iron sights make the chore much easier.





Until now, pistol shooters have been neglected, but J.B. Holden has introduced a tunnel-type see-through mount to fit Colt, Ruger, Smith & Wesson, Dan Wesson and the T/C Contender. New wide-angle mount shown is mounted on the Smith & Wesson Model 29 .44 magnum.

lieu of the conventional slotted screws furnished with most scope mounts. An Allen wrench is furnished with each mount.

Mounting the Holden Ironsighter is accomplished in much the same manner as for most other scope mounts. However, as this mount does not include provisions for windage adjustment in the mount itself, it sometimes is necessary to use thin steel shims to compensate for variations in the contour of a rifle's receiver. The best method in this type of mounting is to leave the windage and elevation adjustments on the scope strictly alone until the mount is shimmed properly and tightened in place on the receiver. From this point on, only minor corrections should be made with the turret adjustments on the scope itself.

For more years than I'll ever admit, I have used many products produced by the Marble Arms Company of Gladstone, Michigan. Some years ago, while attending a gun show in Las Vegas, Nevada, I chatted with Dennis J. Hoegh, Marble's sales manager at that time. That was when he introduced me to the Marble Gamegetter scope mount. It, too, incorporated a sighting tunnel through the length of the base. However, I understand that in recent years Marble has undergone a series of management changes and many items once produced by them have been discontinued from the line. A recent phone call to their plant

The screws in the mounting rings, part of the tunnel-type mount, must be pulled up tight to assure that the scope does not shift or slide under the rifle's recoil.





Once the base has been installed on the rifle, scope is laid onto the rings, assuring perfect contact with mount.

Bish uses the Sweazy Sight-A-Line to collimate the scope with bore. Final adjustments are made with turret knobs.





The author feels that the Holden Ironsighter presents a pleasing, streamlined appearance, but mounts the scope a trifle high over the receiver. In spite of this, the advantage of being able to use iron sights is a plus factor.

revealed that they still had only a limited number of the tunnel scope mounts in stock. No information was given as what rifle actions these mounts were for. They are described here for comparison only.

The shimming of a scope mount to assure alignment doesn't reflect on the quality of the mount. Considerable variations in rifle receivers will occur, all in the same model. This is due to final buffing and polishing either at the factory, when the rifle was new, or in later years, when it may have been rebuffed and blued by an outside source. Variations in the contour of a rifle receiver are especially

prevalent in military models such as the '98 Mauser and '03 Springfield, as excess metal sometimes has to be removed to attain an attractive blued finish. Correct shimming of any mount certainly isn't indicative of the quality of the scope mount or rifle, providing it is done correctly with steel shim stock.

Precisely done, the shim stock between scope mount and rifle receiver is hardly noticeable, even to the practiced eye.

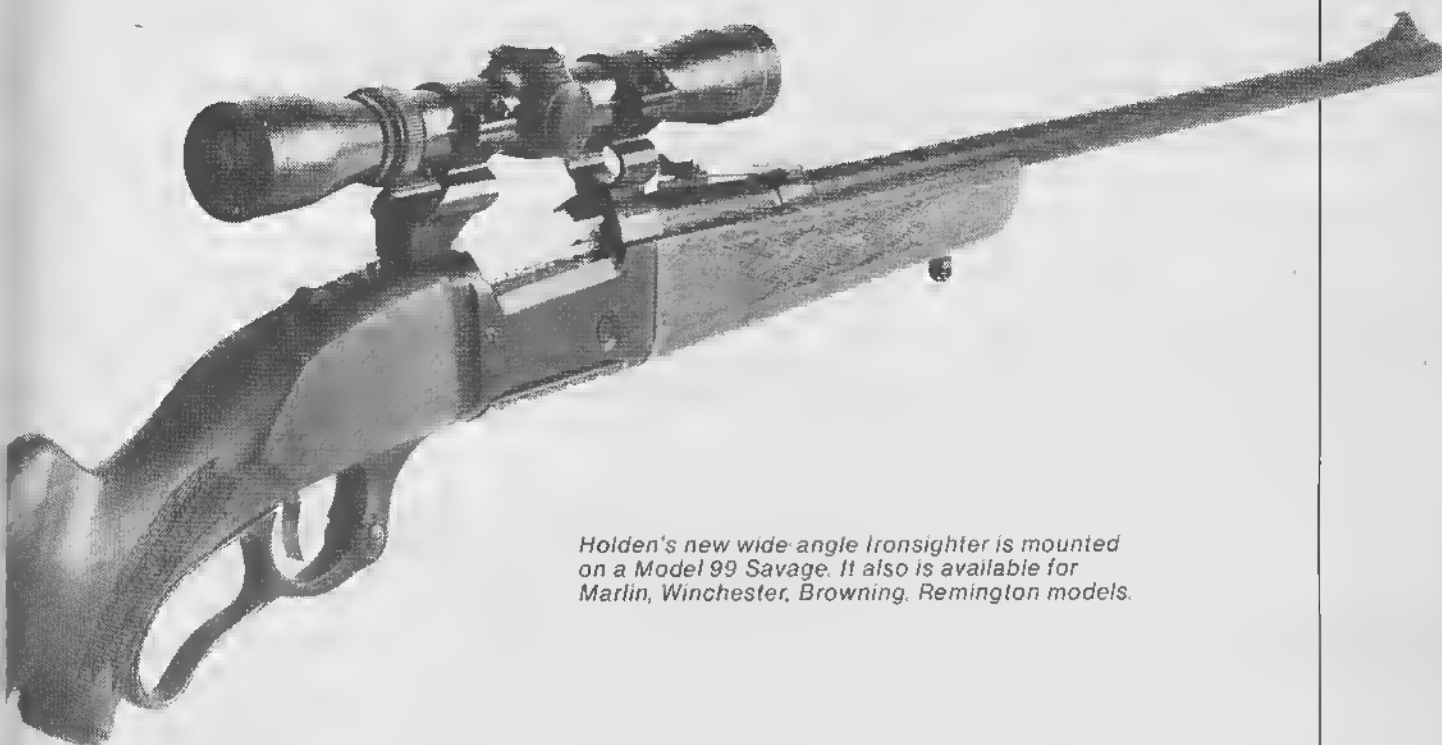
As with any scope installation, the positioning and precise alignment of the mounting base is all-important to



The original Brno mount (on top rifle) appears heavy and bulky when compared to the compact, lightweight Ironsighter tunnel-type mount manufactured today by J.B. Holden Company.



Holden Ironsighter scope mounts are available to fit most quality American rifles and handguns, as well as Mauser-made actions.



Holden's new wide-angle Ironsighter is mounted on a Model 99 Savage. It also is available for Marlin, Winchester, Browning, Remington models.

assure the full potential of the scope's internal adjustments. Take for example a recent installation I made on one of the finer commercial sporting rifles. The scope mount incorporated a one-piece base. With the base securely attached to the receiver, I proceeded to install the scope and rings. However, when the installation was completed and the scope collimated with the axis of the bore, I found that all of the "up" adjustments in the scope's turret had been utilized. I just couldn't lower the crosshairs any farther with the adjustment knob atop the turret.

Removing the scope from the base, then loosening the screws holding the base to the receiver, I shimmed up the rear portion of the base, using nothing but steel shim stock. After a bit of experimentation, it was found that a shim in .030-inch thickness raised the rear portion of the scope

base sufficiently to allow full adjustment from the scope adjustment knobs.

Shimming scope bases should be no by-guess-and-by-golly affair. It must be a precise procedure if accuracy is to be expected. In mounting the Holden Ironsighter, shims were necessary to bring it to a true zero that coincided perfectly with scope collimation. The thickness and placement of these shims quite naturally will vary from one rifle receiver to the next.

At any length, scope mounts designed with sighting tunnels should meet with great acceptance by hunters the world over. It is a certainty that they are fully capable of saving a hunt that might be a bust due to scope failure or being unable to locate game in heavy brush, because of the limited field of view.

Chapter 9

A PASS AT PLATING

*This Relatively Inexpensive Kit Can Create
A Gold Or Silver Finish On Your Favorite Firearm*

The plating kits from Texas Platers are available in several models, ranging from the Gunsmiths' Special which can be used to plate several guns to kits for plating only one or two pistols. Illustrated are the components available for plating with copper, brass, silver, nickel or 23K gold. The more precious metals have become relatively expensive. (Right) In setting about replating this derringer, author made certain the rig was hooked up correctly to batteries.



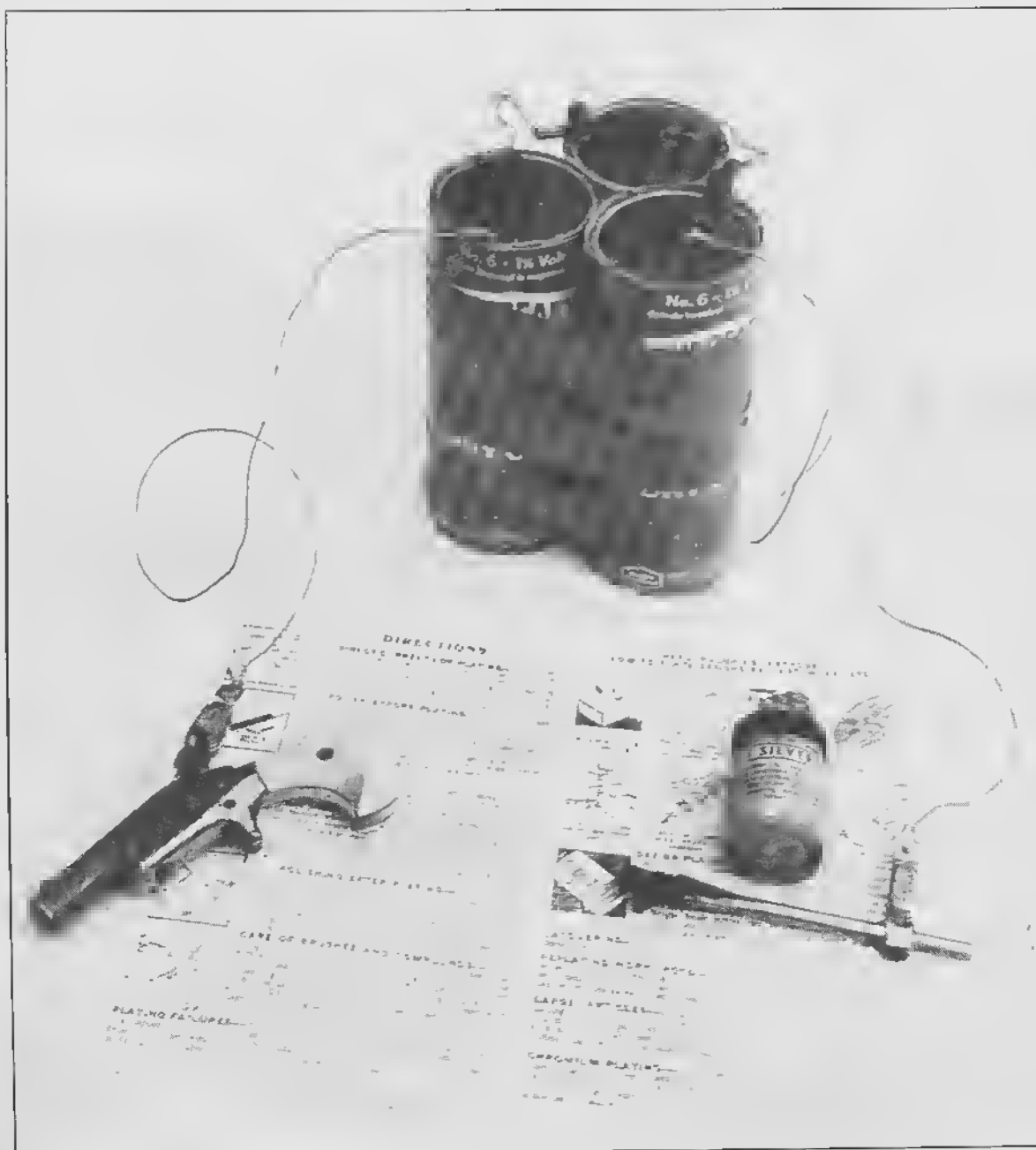
IN GUN WORK, one often is called upon to do many seemingly unrelated chores not directly related to the gun's action or woodwork. This is particularly true when one is repairing, restoring or just cleaning a highly ornate gun that is gold or silver plated.

Over the years, both domestic and foreign arms manufacturers have produced guns that were highly engraved and in many cases, featured gold or silver plate — or both. Quite naturally, such plating is relatively soft. When buffed or polished with harsh cleaners or polishes, the plating ultimately is worn away. In the case of pistols or revolvers, such precious metal coating can be stripped from the gun's exterior by ill-fitting, unlined holsters. However, Texas Platers Supply (2453 W. Five-Mile Pkwy., Dallas, TX 75233) has a plating kit. For novice and professional alike,

this kit is unsurpassed for the restoration of plating on firearms. I have used this kit for many years and can attest to its effectiveness in producing top-quality plating, whether gold, silver, nickel, copper or brass.

Simple to use, the kit requires only two #6 dry cell batteries connected in series — three volts — for general plating work. The five different kits are available ranging from the professional Gunsmiths Special to the Hobbyist Special, so it might be wise to write Texas Platers for their price list on each of the five kits and to determine which best fills your specific need. Refills of the gold, silver, copper, brass and nickel compounds are available from the same source. The gold compounds produce pure 24-karat gold plating and the silver plating is genuine.

In lieu of the two #6 dry cell batteries, one can sub-





Required for plating are two or three #6 dry-cell batteries that are wired in the sequence shown here. This setup was made in preparation for silver plating these dividers.

stitute a battery charger or battery eliminator as a source of power. For longer battery life and possibly faster plating, three #6 dry cells can be utilized, wired in series.

While these kits are designed specifically for gun replating, this doesn't limit their use in plating other items. Tools, musical instruments, household cutlery and a host of other items all may be plated with this kit. Aluminum is excluded however.

With the batteries wired correctly in series, the brush connected to the *positive* pole and the gun part connected to the *negative* pole, this kit is ready to use.

Prior to any application of the plating material, however, the metal must be absolutely clean and the areas to be plated polished. Should the metal surface be coated with oil, wax, dirt or any other foreign substance, the plating metal will not adhere to the surface. This results in a waste of the expensive compounds, so make sure the surface to receive the plating is clean and polished properly.

The procedure for using this kit is quite simple. With the

batteries correctly wired in series, the item to be plated properly connected, dip the brush into the compound, making certain that the bristles and the underside of the anode is well covered. Use a short circular motion, making certain the anode always is pressing the bristles of the brush lightly against the work. Keep the brush always in motion while plating; do not stop. Dip the brush in the compound at intervals to renew the supply of plating metal. Brush each square inch or any smaller surface for at least thirty seconds for light platings, longer for heavier coatings if desired.

Around my gunshop workbench, I have found that by plating certain tools with nickel, rusting is reduced to zero. While gold and silver plating would produce the same results in preventing rust, they are hardly desirable due to their softness and lack of durability under constant use. This is especially true when working with oily or dirty hands. Too, the gold and silver compounds are a bit expensive for such purposes.



Tools such as these well worn scissors can be replated with nickel to preserve and restore them. Those on right show years of use. On left, scissors have been buffed, then replated with kit.

I have been able to restore the worn plating on valuable collector guns to "as original" condition, making my clients extremely happy. Utilizing pure gold and silver as they do, these kits are not inexpensive. However, for every dollar expended on these kits, ten dollars in profit can be realized easily. At today's precious metal prices, professional plating shops charge a small fortune for even the smallest job. So, these plating kits are ideal for the gun worker or the professional gunsmith whose plating jobs are somewhat sporadic in terms of time.

The plating applied to your satisfaction, you may wish to give the surface a softer matte finish, reducing the high polished finish to a duller tone. This may be accomplished by lightly rubbing the plating with crocus cloth or fine steel wool; however, this dulling process must be done with an extremely light-fingered touch. As gold and silver both are extremely soft metals, they are removed easily with overzealous polishing or rubbing.

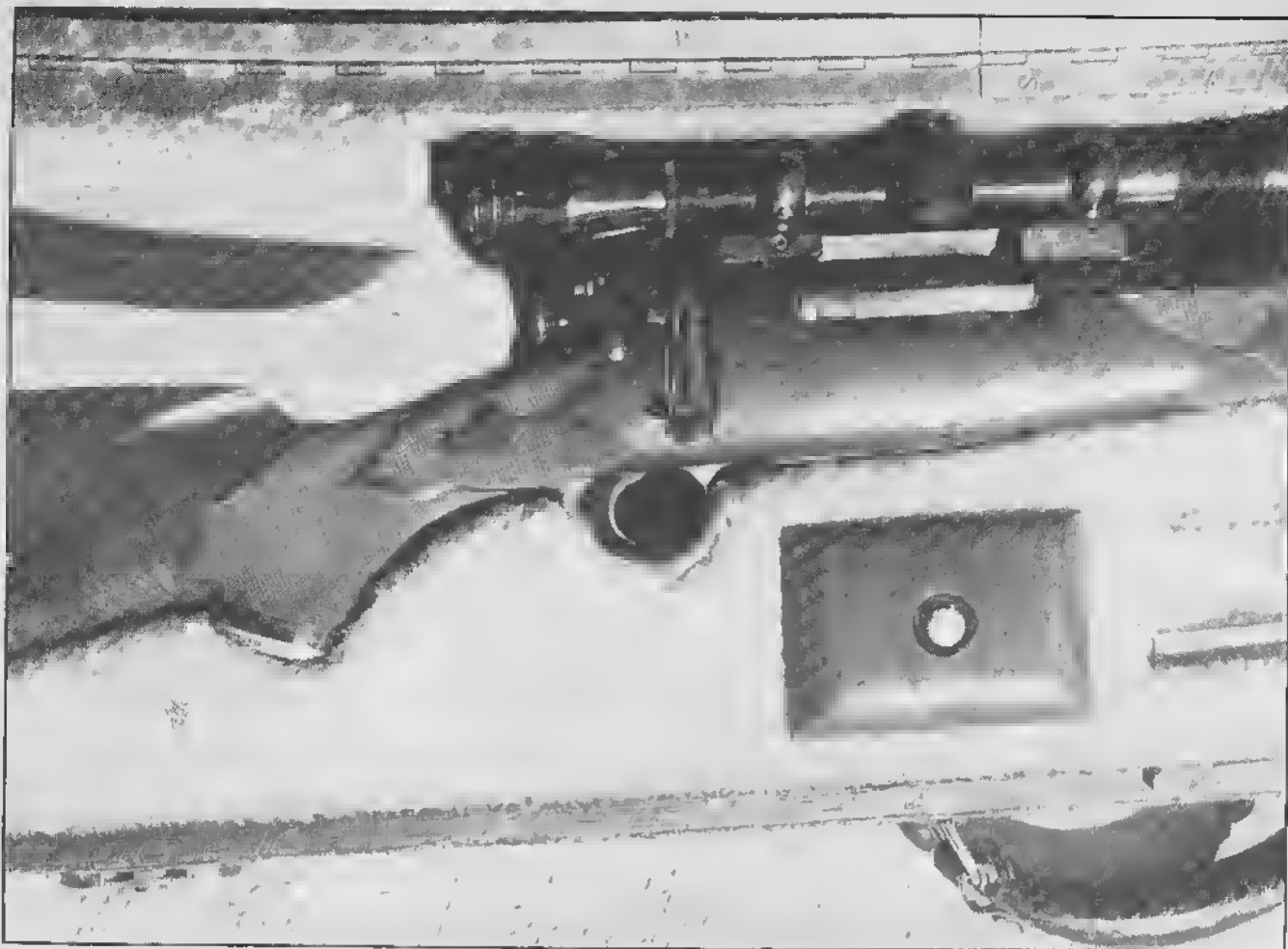
Once the desired finish is achieved, a protective coating

is needed for the sake of durability. Clear lacquer in aerosol cans is available at most paint stores. Using the best brand available, the lacquer should be misted onto the plated surfaces, then allowed to dry thoroughly. Do not overspray.

In lieu of the aerosol cans, brushing lacquer may be used, utilizing a soft mink hair bristled brush. Flow the lacquer on in a smooth, even coat. When the lacquer has dried thoroughly, the surface might be given a coating of pure carnoba wax to further protect the surface.

The plating job completed, one should clean the plating tools thoroughly; but first replace the lids on the compound jars to prevent them from drying out. Wash the brushes clean, removing all compounds from the underside of the anode, then allow these brushes to dry.

The wiring clip that connected to the brush and the one that was attached to the work surface also should be washed thoroughly to remove any compound. Even minute traces of compounds left on these vital components will affect



Various parts of custom rifles can be plated with gold or silver, thus enhancing appearance and value. The author's custom Springfield .308 Norma magnum rifle has the bolt handle, thumb safety knob and the extractor gold plated.

your work adversely the next time they are used.

Chrome plating is not practical with brush platers such as this. However, I have found that a good plate of nickel applied to chromed surfaces overlaying brass, copper or bronze works out quite well. However, there will be a slight difference in color. This is hardly noticeable and not objectionable.

In addition to regular full surface plating, one might like to plate his initials or a design on some particular item. Using the nickel compound, it is only necessary to mask off those sections of the design where plating is not desired, then proceed with the plating operation in the usual manner. The plating compound will not adhere to any surface covered with the masking tape, only to those surfaces within or surrounding it.

After having used this kit for many years, I have found that when my plating job wasn't successful, it was because I invariably had been responsible for some minute oversight. These failures were a result of any one of the following: (1) Reversed current with the brush and work connect-

ed to wrong wires; (2) broken wires or bad connections; (3) insufficient compound on the brush or the compounds were mixed on the brush; (4) low batteries; (5) lacquer or other transparent materials on the work; (6) inversion of the compounds because of improperly cleaned brushes; or (7) clips not solidly attached to work or brush. Check for each of these and you should have no problems with the Texas Platers kit.

I have replated such items as gold-plated watch cases, costume jewelry, small derringers, hammers, triggers and other firearms components, screw heads, washers, and a host of other items. If it is made of metal, it can be plated with this kit. Read the directions furnished with each kit thoroughly, then follow them to the letter if a perfect plating job is expected.

An added note concerning nickel plating: Add a few drops of water to the nickel compound and raise the voltage up to twelve volts. This is possible when using a battery charger as a source of power. Nickel plating seems to do a better job if the solution is thinner than the other compounds.

When gold or silver plating steel, it is necessary to use a copper undercoat. First plate the steel with copper, clean it thoroughly, then apply the gold or silver compound in the conventional manner.

Change the brushes each time a different solution is used and never use a brush that has not been cleaned thoroughly and dried. It may sometimes be advantageous to increase the voltage to six or eight volts. A bit of experimentation will soon determine whether to use three volts or increase it to as much as twelve volts. I've found this depends upon the composition of the metal being plated.

While this plating kit is highly recommended for touch-up and smaller jobs around the gunshop that require gold,

silver, brass, copper or nickel plating at a nominal cost, it must be recognized that more complex and costly plating outfits are needed for those who want to do large production work. However, when one goes into more complex plating, he will need additional space for such an outfit and can look forward to the outlay of considerably more cash.

Professional plating outfits begin at around \$125 for Brownell's Hoover Plating Outfit, increasing in price to as much as \$500 for large-capacity plating outfits. These are hardly necessary in any gunshop, however, unless one intends to go into complete plating of rifles, shotguns and pistols. This is a highly specialized field in itself and is not recommended for the amateur or beginning gun crafter.

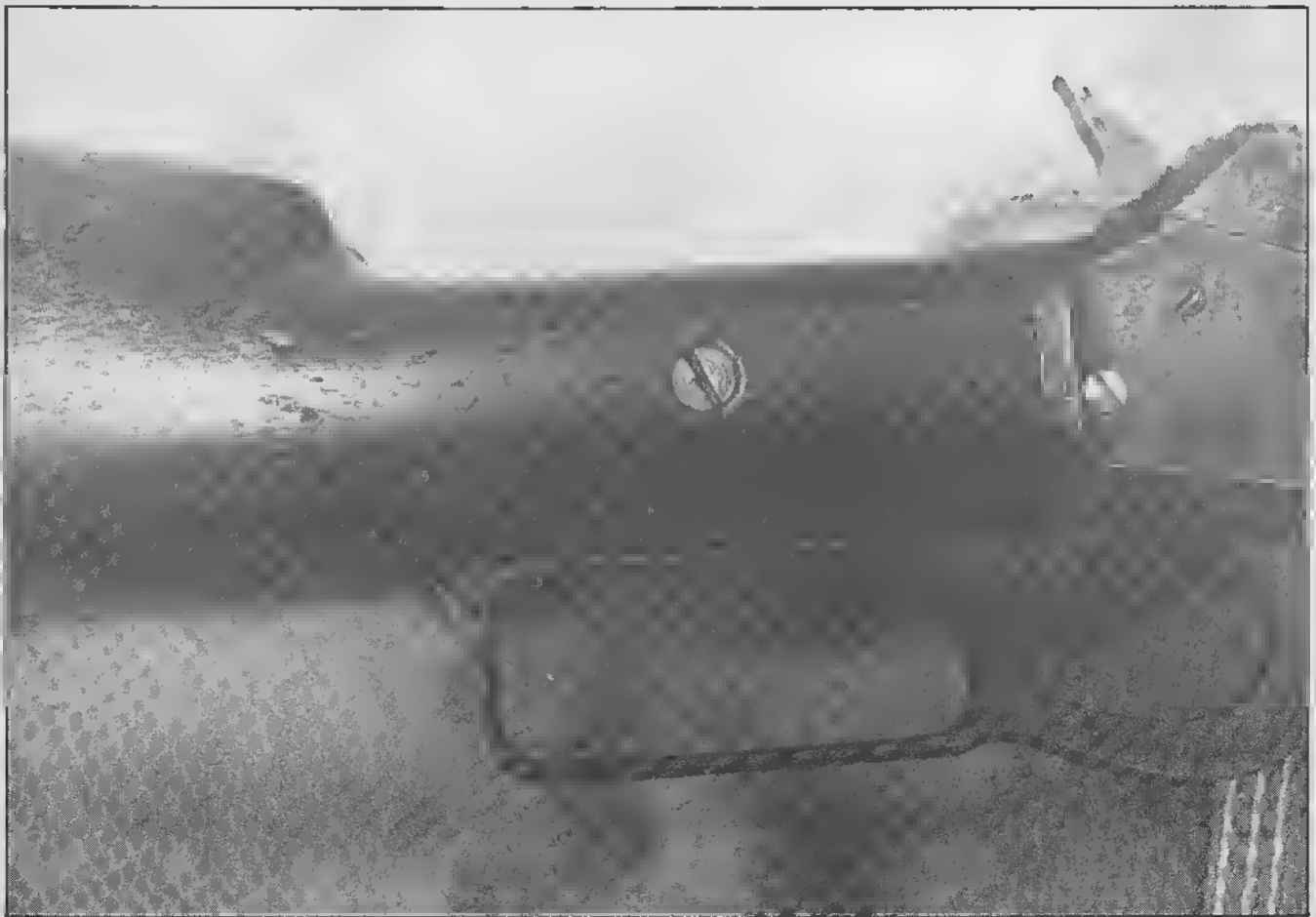
The author nickel plated the bullet mould and powder flask for the cased derringer covered in another chapter. In lieu of the #6 dry-cell batteries, Bish used his power charger set at six volts as a power source with success.



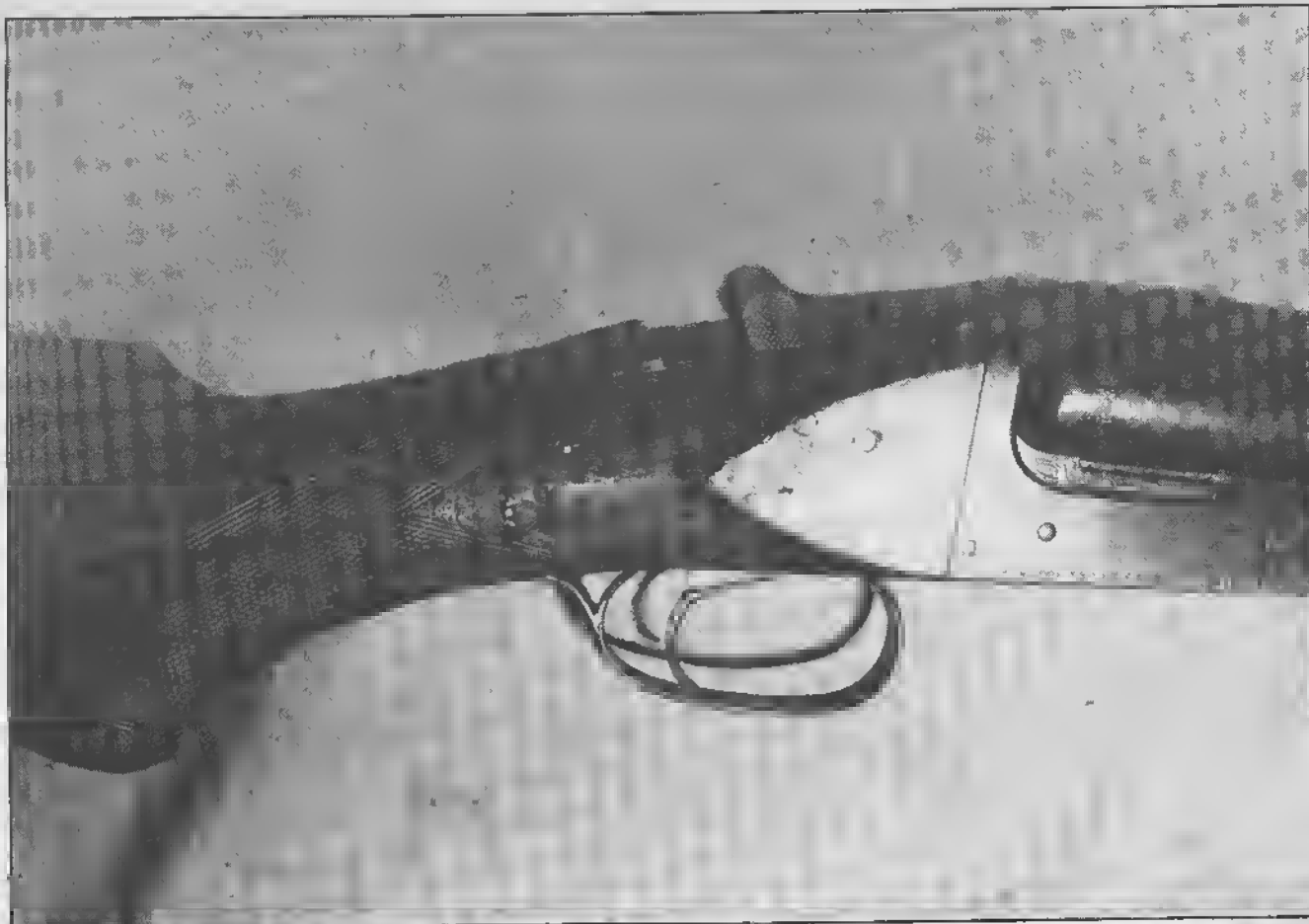
Chapter 10

DONT'S FOR THE BEGINNER

*There Is Little Market For Firearms Butchery,
So Approach A Gunsmithing Chore With Proper Caution*



The repair job on this carbine stock smacks of amateurism and the stock probably will fail in a short time. Repair should have been accomplished with strong wood glues or epoxies so that the job would have been neat, invisible.



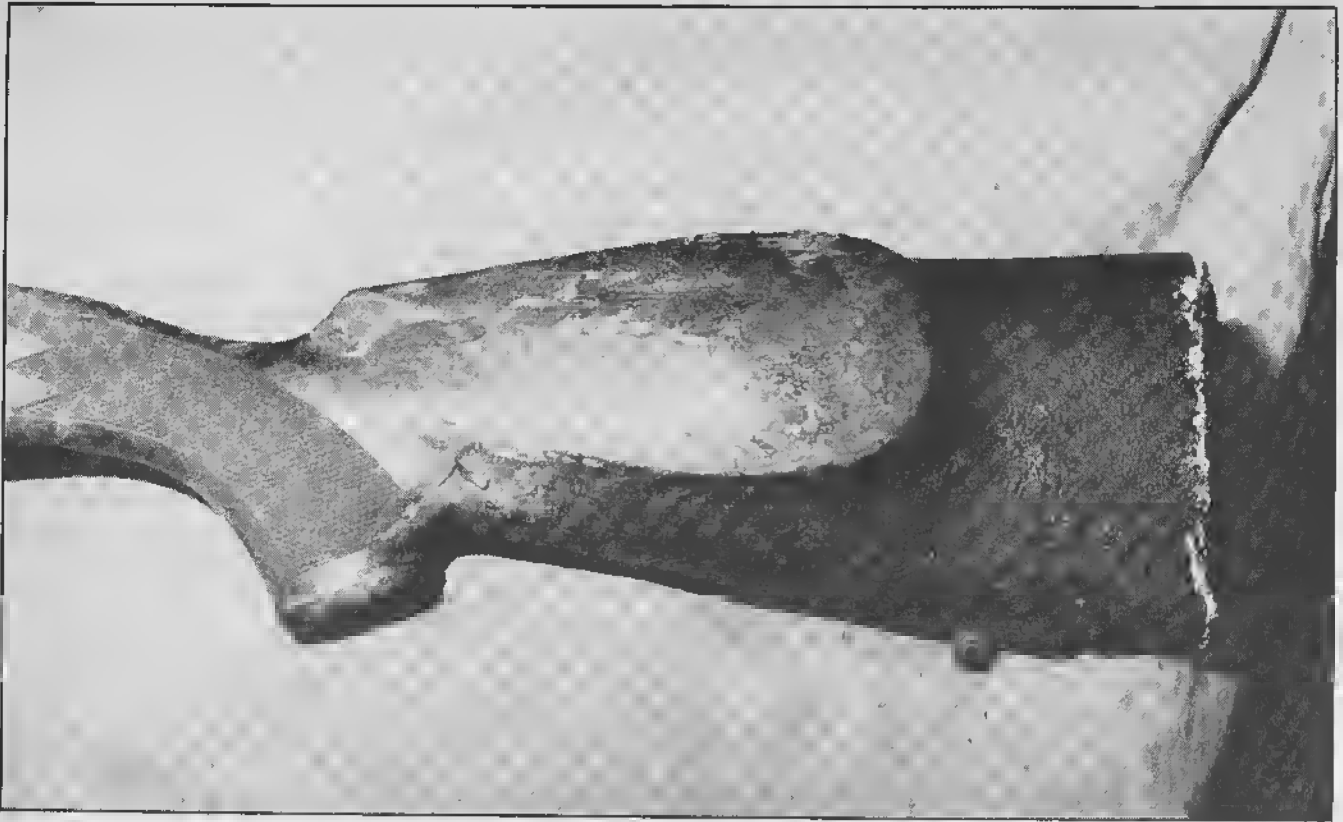
This is another example of what the author considers to be shoddy stock repair work. Nails and brads in the wood only weaken the stock more, while the proper glues or epoxies can strengthen the wood and are unnoticeable.

OVERTHE years, I have witnessed some pretty atrocious butcherings of good guns by those who "meant well." The fact that they didn't know what they were doing didn't faze these hacksaw artists in the least. They had their ideas of how the job should be done, and that is the way they were going to do it. The end result was all too often a gun damaged beyond repair.

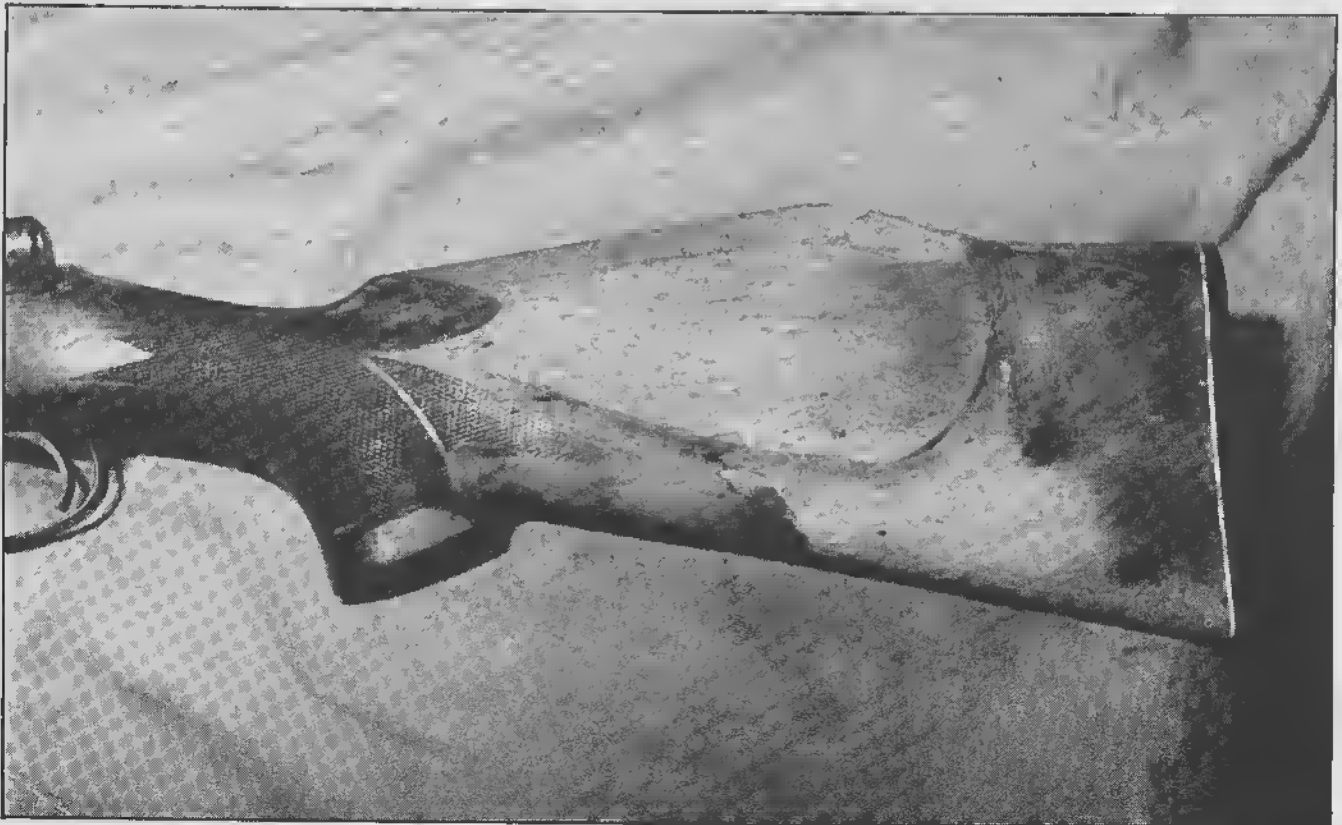
Whether rifle, shotgun or pistol, there are some jobs that should not be attempted by the newcomer to gun work; there are phases of gun work that require years of experi-

ence. The seemingly simple chore of mounting a scope on the pre-drilled receiver of a sporting rifle — and doing it right — requires experience. I have seen and heard of countless scopes that literally fell off the rifles the first time they were fired, or were so far out of zero on that first shot that they were useless. Then there are screwhead slots so burred and chipped by ill-fitting screwdrivers that they were good for little but the scrap box.

On no few occasions I have had fine, high-quality revolvers brought to me with actions that couldn't be believed. When questioned as to who had worked the piece



This mangled stock resulted when a welding torch was used too close. The stock had just been given a new coat of stock oil, which was highly flammable. (Below) The same stock was salvaged by splicing a section from another less damaged stock into the burned area. If splicing is done properly, the area should be nearly invisible and probably will be the strongest section of the wood. A good deal of work remained to be done in reconstruction.



over, the client almost invariably offered a variation of, "Oh, Joe Doaks over in Hacktown. He works in his garage. He tuned it up for me."

Old Joe Doaks in Hacktown had tuned the gun almost beyond reclamation. First, he had taken files to the intricate inner parts, then had smoothed these up with a coarse oil stone. When finished, the revolver wouldn't stand on full cock, the cylinder would not index correctly and the cylinder crane was inoperative. The damage was so extensive that the revolver had to be sent to the factory for all new parts and a major overhaul. It cost my client over two

brought a semi-auto .22 rifle of good make into this man's shop. The owner complained that the rifle wouldn't feed the cartridges properly into the chamber and it jammed on about every other shot.

What did my acquaintance do? After working the action a few times, he removed the barreled action from the stock to check the rear section of the magazine housing. It seemed that the factory had left out the all-important cartridge stop spring that is supposed to be located on the underside of the tubular magazine. The instant expert proceeded to drill and tap a hole into the tubular magazine, then installed

Mounting rifle or pistol scopes requires more expertise than simply screwing the components to the frame or the receiver. The scope must be collimated to the exact axis of the bore if required accuracy is to be achieved.



hundred bucks to return the gun to safe shooting condition because of a slipshod \$5 tune-up job by the Hacktown expert!

Another atrocity came to light soon after an acquaintance bought a copy of the First Edition of *Home Gunsmithing Digest*. He read it from cover to cover, then proceeded to open his own gun repair shop. Over the years this fellow had done a little gun work in his home as a hobby, this, and the fact that he had read the first edition of the *Home Gunsmithing Digest*, supposedly qualified him as an instant journeyman gun mechanic.

It was a nice, sunshiny day when an innocent customer

brought a semi-auto .22 rifle of good make into this man's shop. The owner complained that the rifle wouldn't feed the cartridges properly into the chamber and it jammed on about every other shot.

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a spring "with a slight hook in the end to stop the cartridges," as it was explained to me later.

The newly installed brainchild of this man completely jammed the feeding of the cartridges through the magazine tube. It also prevented the barreled action from seating fully in the stock.

To remedy that problem, he proceeded to chisel out that area of the stock where the newly installed screw and spring contacted to prevent the action to seat fully. Now the action did seat fully into the stock, but the rifle still wouldn't work.

In desperation he called me, asking what might be wrong.



Bish selects the proper size screwdriver from his own collection for use in mounting a rifle scope. He says the proper tools are a necessity for each individual job if one is to achieve status among professional gunsmiths.

When he told me of his innovations to the rifle's action, I was ready to throw up my hands and give him a piece of my mind. Instead, I drove to his shop, examined the rifle, removed the newly installed screw and spring, carefully plugged the threaded hole then completely cleaned the rifle's action before oiling it lightly. We then loaded the tubular magazine with .22 long rifle cartridges, went to the range and found that the rifle functioned perfectly.

Few people seem to realize that simple cleaning of a rifle can make all the difference in the world in its shooting qualities. This is especially true of semi-auto .22 rifles. If they become crudded up with powder residue, dust and

dirt, they are going to give you trouble. The moral of this story is: If you are not sure of the problem, *don't* start drilling and tapping holes that weren't meant to be there in the first place! And never add a part of your own manufacture to a gun's mechanism just because you think it might work.

The major gun companies in this country employ fine, qualified engineers for design of firearms. The arm is thoroughly tested at the factory and, with rare exceptions, when offered to the general public for sale, these guns are about as perfect as they can be.

For the beginner in gun work, as well as to those who

have been doing such work for some time as a hobby, it would be well to bear in mind the rule: If you are not sure, don't do it! Do not attempt any type of gun work that ordinary horse sense says you are not qualified to do. Limit yourself to your own capabilities and I can assure you that in time you will catch on to many of the tricks-of-the-trade that are valued highly by professional gun craftsmen.

For the beginner, I recommend a set of books published by Brownell's of Montezuma, Iowa. These two volumes are highly prized by working gunsmiths the world over.

Gunsmith Kinks, published by Bob Brownell with data furnished by journeymen gunsmiths the world over, in-

cludes thousands of tips on doing all phases of gunwork — and doing it easier. It has taken many years of hard work to compile all of this information into these two volumes and can save the beginning gunsmith endless sweat and tears in determining how a certain gun job might be accomplished.

As mentioned elsewhere in this volume, building various gun kits is an excellent training aid for the beginner. He soon will discover the mistakes made in constructing these gun kits. It is from these mistakes that one should learn the right way to do gun work. Cash in on this knowledge by not making the same mistakes again. It is learning the hard way, but is unexcelled for experience in correct handling of

One never should pound or even tap the surface of any firearm with steel hammers. Instead, use hammer with a nylon face to protect metal surfaces.



tools, learning which tool is best for a specific job and, when the kit is completed satisfactorily, the satisfaction of knowing that you did it all yourself.

Do sloppy and haphazard work and you will end up with a pile of expensive junk. Some gun kits are quite expensive.

More years ago than I care to admit, when I first began gun work, a friend in the combustible rubbish business had salvaged an old, rusty Colt Single Action from someone's trash. In due time, I traded him a new Daisy BB gun for this relic. The Colt had no grips and the missing cylinder pin had been replaced with a rusty nail.

With a dull saw and even more dull pocketknife I fashioned a set of grips for this old gun, solid rust though it was. The grips, as I recall, were made from a section of an old apple box I found in the backyard. Not being familiar with the mode in which these grips were attached to the pistol's straps, I nailed each of the two grips to the gun's frame with wire brads. Then I stained them with some brown shoe polish. For the cylinder pin — after removing the bent rusty nail — I found a hinge pin in my dad's parts box that fit the hole perfectly.

Despite the fact that the gun was in very ill repair, the trigger frozen in rust, as was the hammer, I was the proud-

For precision cutting chores, Bish insists on edged tools that are sharp. From experience, he long ago learned that a dull file, chisel or even a less-than-sharp hacksaw blade will result in shoddy work, often beyond repair.



est kid in the area with that restoration job. I was about 5 or 6 years old at the time.

In the many years since, I have learned that pistol grips should not be nailed to a gun frame and that hinge pins are not suitable as cylinder pins. However, I never have forgotten that first restoration effort, crude though it was. It was still experience and I learned from it.

I know a great number of gun hobbyists who do fine work. For the most part, these men are gun collectors who came to realize that to keep their valuable gun collections in top condition, they must learn to do some repair work themselves. Because the guns in their collections are both

valuable and rare, they only undertake the work they know they can do correctly. For the more complicated work, such as making rare replacement parts or extensive stock repair, they take the work to one they know is fully qualified and capable of doing it right. This is smart thinking!

As elaborated on in another chapter, one of the basic secrets to good workmanship involves the tools used. Keep edged tools sharp, use the correct screwdrivers, pin punches and files for each job.

Next to tools, the next prerequisite for good work is untold amounts of patience and plain, old horse sense: If you don't know how to do it, take it to one who does!

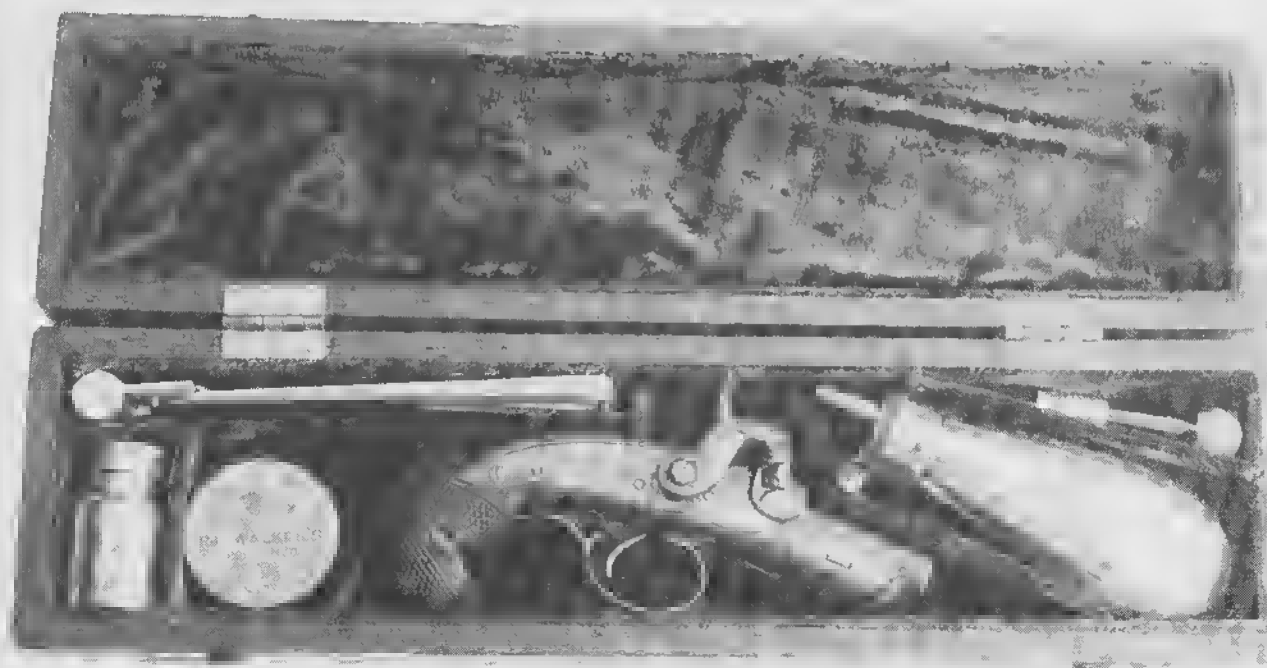
The author says one never should use unfamiliar chemicals in gun work. Some can be dangers to eye and skin if used improperly. Read the directions.



Chapter 11

BUILDING YOUR FIRST GUN

*A Kit Can Be Both Demanding
And Educational For The New Gunsmith*



When the replica Lincoln derringer was completed, the author built a special case to carry it, along with powder flask, a bullet mould, loading rod, percussion caps and an oil bottle fashioned from silver, adding to an authentic look.



As received, the Lincoln derringer kit from Dixie Gun Works contains everything that is needed for completion of the unit, making it an attractive piece with furnished inlays.

WHEN IS a derringer not a Deringer? This term has confused countless people for over 140 years. About 1845, Henry Deringer, Jr. made his first percussion pistol for the U.S. Navy. Prior to that, Deringer had made entirely by hand flintlock muskets and pistols for the Army. Sometime, during these early years, Deringer was to create and manufacture a firearm that would assure him notoriety and fame that has lasted to this day, although he died in 1868.

The firearm that has made the name of Henry Deringer familiar even today, became famous due to the infamous

event that occurred on April 14, 1865, at Ford's Opera House in Washington, D.C. It was there that John Wilkes Booth assassinated President Abraham Lincoln. The gun used was described as being small in size but of large bore.

In later years, the term, "derringer pistol," became synonymous with any small handgun of large bore, whether it be the percussion type or fired a metallic cartridge.

Because an arm such as this has great appeal to both collector and novice alike, Dixie Gun Works of Union City, Tennessee, offers a kit for building a vintage pistol like the one in the Ford's Opera House incident.



The sharp corners of the barrel should be rounded over slightly and visible tool marks and scratches removed.

Over the years, I have built about every worthwhile gun kit available, ranging from a blunderbuss to a flintlock Kentucky-type rifle. It is my contention that building these kits can provide challenge to professional and novice alike. In fact, I have seen far better jobs done on these kits by so-called amateurs than were done by some who claimed to be professional gunsmiths. Creating a finished firearm from one of these kits — and doing it right — requires painstaking work, providing a degree of experience that is an excellent teacher for any type of gunwork. Such kits, if properly finished, also will provide a great deal of satisfaction and pleasure for the astute gun buff. It also will tend to separate the true craftsmen from the hacksaw-and-hammer jockeys!

Dixie Gun Works has titled this unit the Lincoln Deringer Kit. It contains all necessary parts, such as inlays, screws, complete percussion lock, a .41 caliber barrel and a semi-finished wood stock. All the builder has to furnish is a few minor handtools, such as sandpaper, small chisels, files and a great deal of demanding workmanship. A real craftsman can end up with a worthwhile replica of the original arm that has considerable value. The hack artist can just as easily end up with an expensive piece of junk!

The first step in assembling this unique little bandgun will be to examine the barrel closely. With such inspection, I found that the barrel requires considerable smoothing and some shaping to conform more closely to the original.



The rear portion of the replica stock's barrel channel must be chiseled out a bit in order to conform to the breech section of the barrel, thus providing a snug slide fit. The author advises that great care must be exercised.

On the kit I received, tool marks are apparent overall in the barrel's surfaces. These marks should be carefully removed, first using fine files, then various grades of emery cloth. The sharp edges along the sides of the barrel should be rounded and the muzzle tapered.

Once you have the barrel smoothed to suit you, the next step is to inlet it into the wood stock. One should be extremely careful during this operation, as this finely contoured wood stock is quite fragile and will not stand any great amount of rough treatment.

Lay the barrel atop the stock, noting the areas of the wood that must be removed to allow the barrel to seat fully within the stock.

Due to the original machining, the corners of the mortise that accept the breech section of the barrel are rounded instead of being square. Carefully chisel out these corners only enough to square them up; remove as little wood as possible.

The next step is to fit the barrel channel in the stock to the contour of the now semi-polished barrel. It is essential to remove no more wood than is necessary to allow the barrel to slide fully into the stock. During this fitting, the rear tang must be taken into consideration. This tang must be fully seated in its groove, too. It might be necessary, as it was in my kit, to slightly bend the rear tang to conform to the contour of the wood stock.



The barrel and lock of the gun must be fitted precisely to the wooden stock, with no gaps, cracks between metal, wood.

To this point, only minute amounts of wood have been removed from the stock, this is as it should be. Once the barrel is seated to your satisfaction, turn your attention to the lock.

The lock will require some careful fitting into its mortise to prevent cracking the stock, so be especially careful during this operation. It is possible that the lock components will bottom out before the lock plate is fully seated. Using Prussian blue, or any other marking dye to determine where the lock parts might be bottoming out before the lock is fully seated, chisel away only minor layers of wood from the mortise bottom to allow the lock and its component parts to seat fully in the mortise. At this point the lock plate should sit flush with the wood of the stock, not below or above it.

Inletting the barrel and lock into the wood of the stock should have required several hours of painstaking workmanship. From now on, the little derringer will begin to take shape.

Assemble all of the nickel-silver inlays before you. There should be eight of them, including the trigger plate. The teardrop inlay goes into the butt section where a mortise is precut to accept it. It is possible that minor filing will be necessary to allow this inlay to seat properly. Too, this inlay may require slight bending so that it will conform properly to the contour of the stock. Due to the extra thickness of these inlays, it will be necessary to bury only about half their thickness into the mortise. Later, the inlays can be filed or disc-sanded to the surface of the wood.

Inlay each of the eight pieces in their respective mor-



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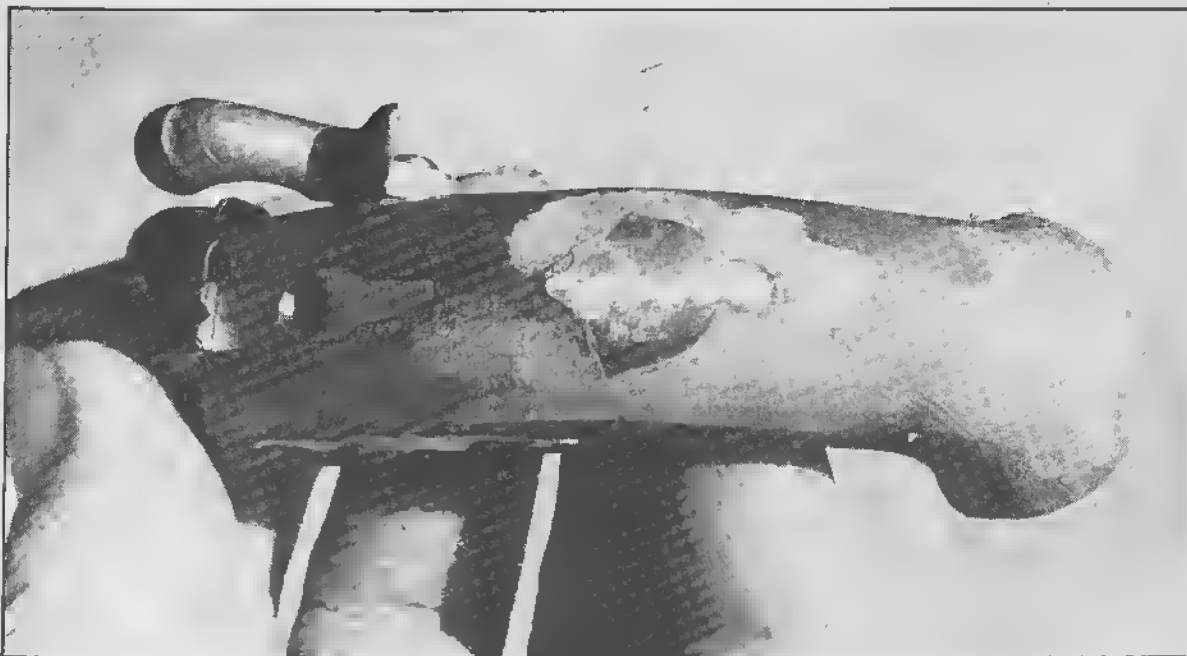
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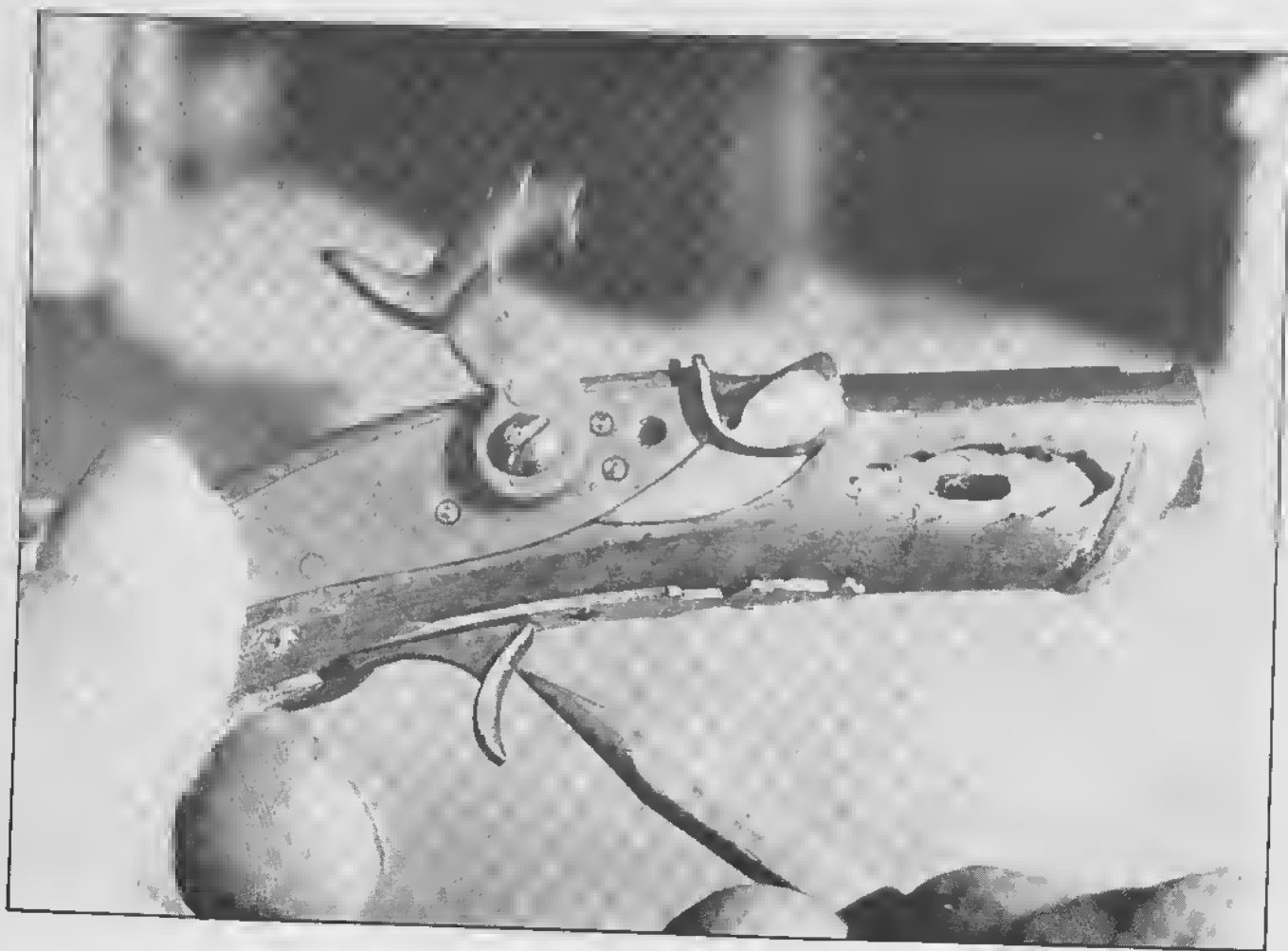
Above: With the barrel and lock in place, the inlays may be installed, then cemented in place with an epoxy. (Left) Slight bending may be needed with the butt inlay to ensure perfect fit to the contour of the stock wood. Note that wood is in unfinished state.

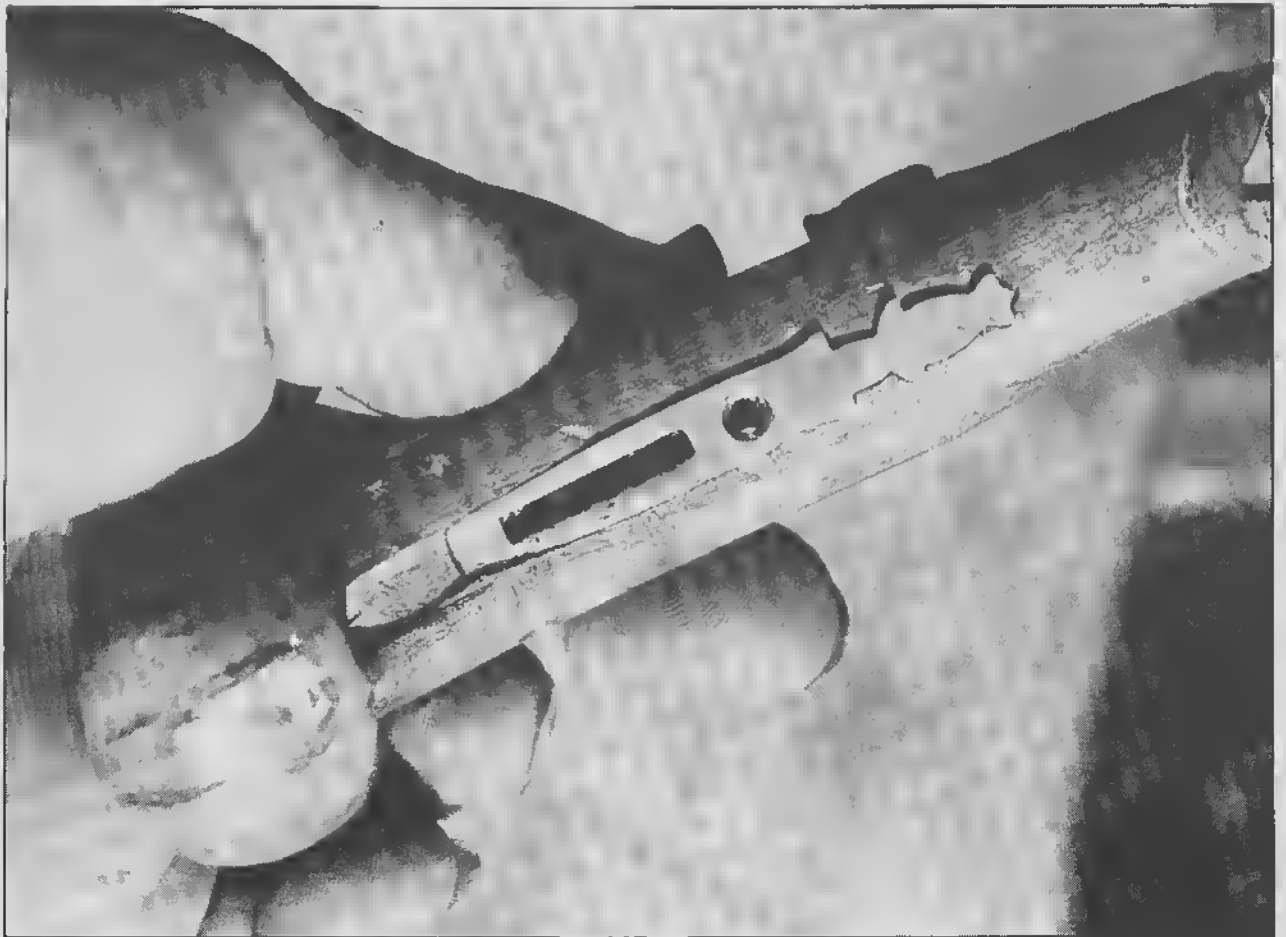
small accessories are ideal for polishing the inner surfaces of the trigger guard and around the drum and nipple on the barrel.

A good method for holding the derringer during the finishing operation is to insert a snug-fitting length of wooden dowel into the bore, the barrel in place on the stock. This dowel can be approximately four inches in length. The section of wood extending from the bore can be clamped in the bench vise. This allows the derringer to be turned to any angle at will, affording access to any parts that require finishing.

In the finishing operation, such iron parts as the lock, hammer and barrel may be either blued or given an aged brown patina look. Birchwood-Casey Liquid Gun Blue or

Below: With lock and barrel in place, positioning of the trigger is determined. It must contact the sear of the lock tightly when the hammer is at full cock. Trigger pin then is installed by drilling a 1/16-inch hole in the lock mortise to accept the pin. (Right) A good method of affording access to all portions of this little replica for sanding and finishing is to install a snug-fitting wood dowel in the bore. The other end of the dowel then is clamped into a bench vise. (Lower right) The trigger plate is not epoxied in place. It is held, instead, by the screw just forward of trigger slot.







With all inlays dressed to the surface of the stock, all nicks and scratches removed, the entire stock then can be sanded lightly with fine garnet paper before it is given a coating of wood filler in the finishing process.

the same firm's Plum Brown may be used. Finishing of these parts as to color — blue or age brown — is at the discretion of the individual builder. Incidentally, installation of the front sight, a simple chore, should be done prior to finishing the metal of the barrel.

Once the entire stock has taken on a glass-smooth surface, with all pits and scratches removed from the inlays, the wood stock is ready for first a sealer, then the final finish of Tru-Oil. Follow the directions on each bottle for a perfect finish. A couple drops of Tru-Oil should be sufficient for the complete job. Spread the Tru-Oil sparingly and evenly over the entire surface. Extremely thin coats of



At this point, the derringer is ready for its final finish with Tru-Oil stock finish. However, for the best results, the finish should be used only sparingly, with craftsman sanding the wood lightly between application of the coats.

finish are far better than one or two thick coats in that they will produce a finer finish.

After a couple of days have been allowed for drying, the entire gun may be waxed and the lock and barrel lightly oiled. Prior to final waxing, however, the Tru-Oil stock finish should be removed from all inlays with the careful use of 0000 steel wool. Take pains during this phase not to disturb the oil finish on the wood proper.

To add to this historic replica's attractiveness, I built a suitable case of walnut with compartments for a bullet

mould, powder flask, percussion caps and even a small loading rod. This box has a hinged lid and has been as highly finished as the gun itself.

Despite the fact that this replica was built from a kit, if properly assembled and finished, its value can easily increase to \$200 or so. After all, the originals of these tiny handguns are selling daily for \$2000 and up! The original Lincoln Deringer is priceless and cannot be bought for any amount of money. Hence, this replica is well worth owning as a show piece.

Chapter 12

OF STICK & STONES

*Sharpening Of Tools And Knives Requires
The Proper Stones And A Degree Of Knowledge*

When it is sharpened properly, the edge of a knife should be capable of shaving hair from the arm. If this cannot be accomplished, the author contends that the knife is still dull or the sharpening was improperly done.



ONE OF THE most pleasant parts of any successful hunting trip is when the game finally is bagged and hung for skinning. But it helps when the keen edge of the skinning knife unhesitatingly goes about its work of removing the pelt or hide.

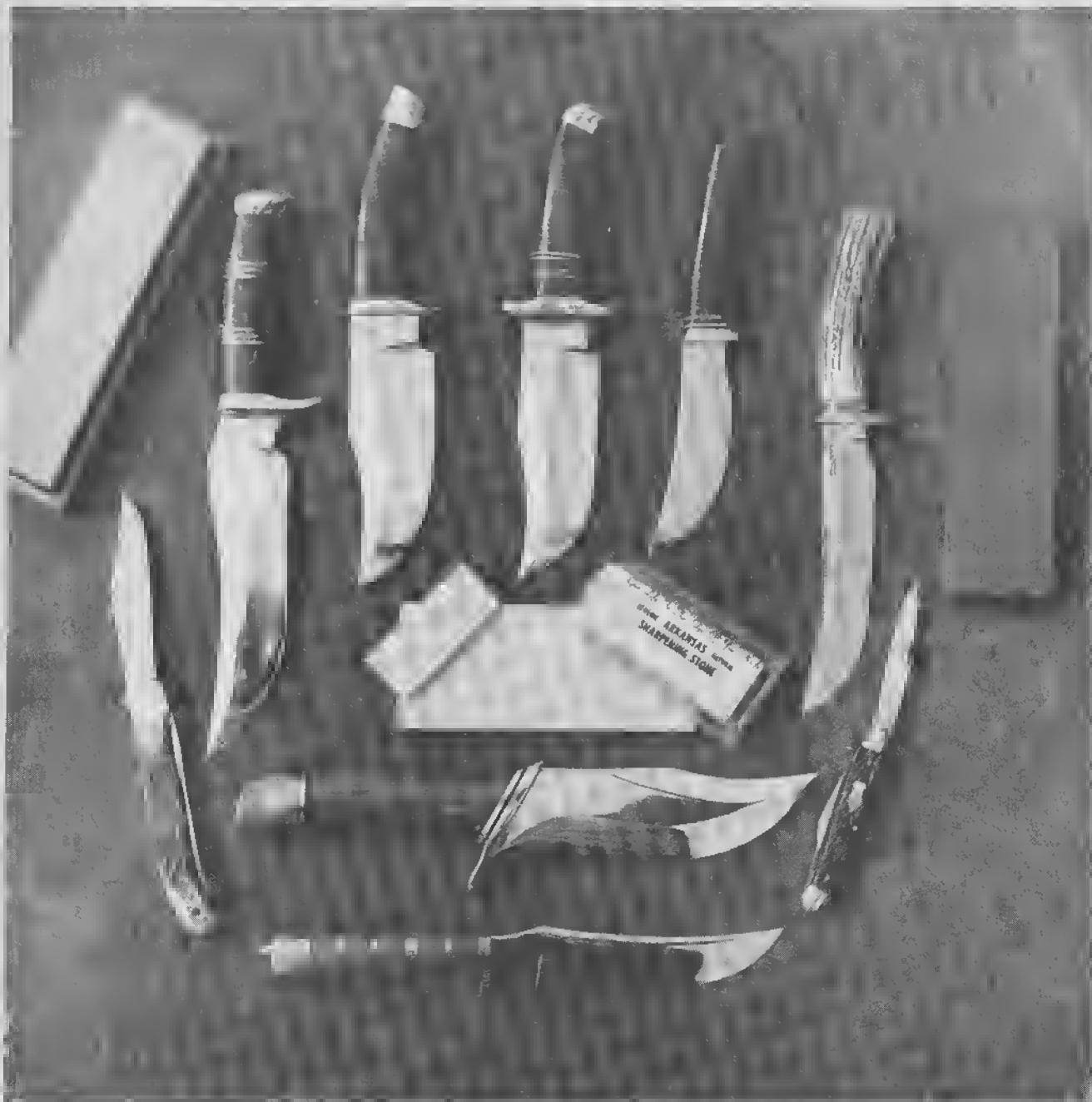
On the other hand, nothing can make for a short temper faster than to have to use an unkempt knife so dull it won't cut whipped cream!

In this day of modern technologies in cutlery steels, there is no excuse for any edged tool being dull, whether a

hunting or skinning knife, a camp ax or the various edged tools found on your workbench. Good Arkansas abrasive oil stones are neither scarce nor expensive these days.

Those who have spent considerable time in hunting country, at times depending on the land and its wildlife for their sustenance, know the value of a sharp knife and a good oil stone. Those of us who have spent countless hours over a hot workbench, turning out a self-built custom sporting rifle, or making our own hunting knives, know the full value of tools that are sharpened properly.

The first consideration in attaining a keen edge is to



A fine variety of custom-made cutlery is available today, all of the various styles, models deserve the proper care.

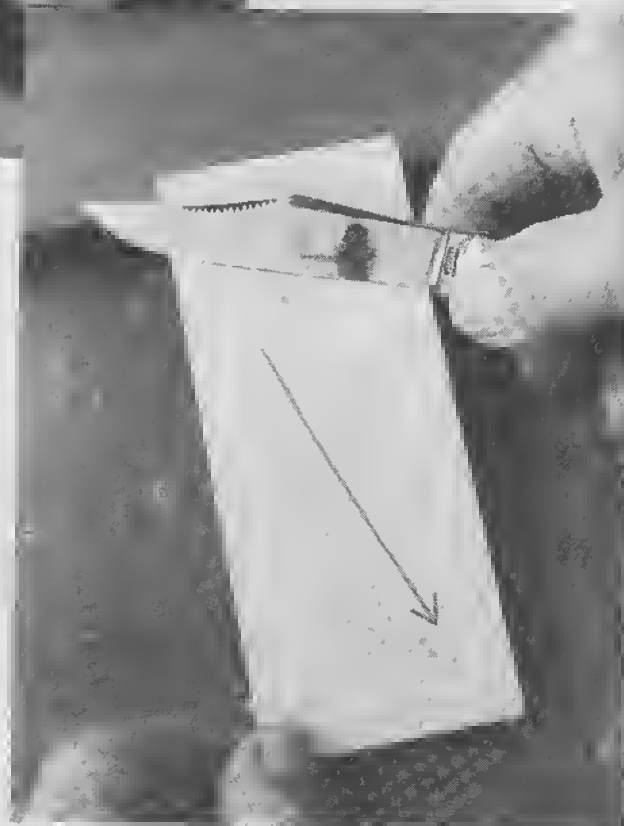


Below: Pocketknives are easy to keep sharp. The blade is brought across face of stone in a continuous swipe (note arrow), making certain blade is swept in a rocking motion across stone toward the point.

In resharpening gunsmithing chisels, once the edge has been brought to ultimate keenness, it should be touched up lightly on the stone to remove any minute burring.

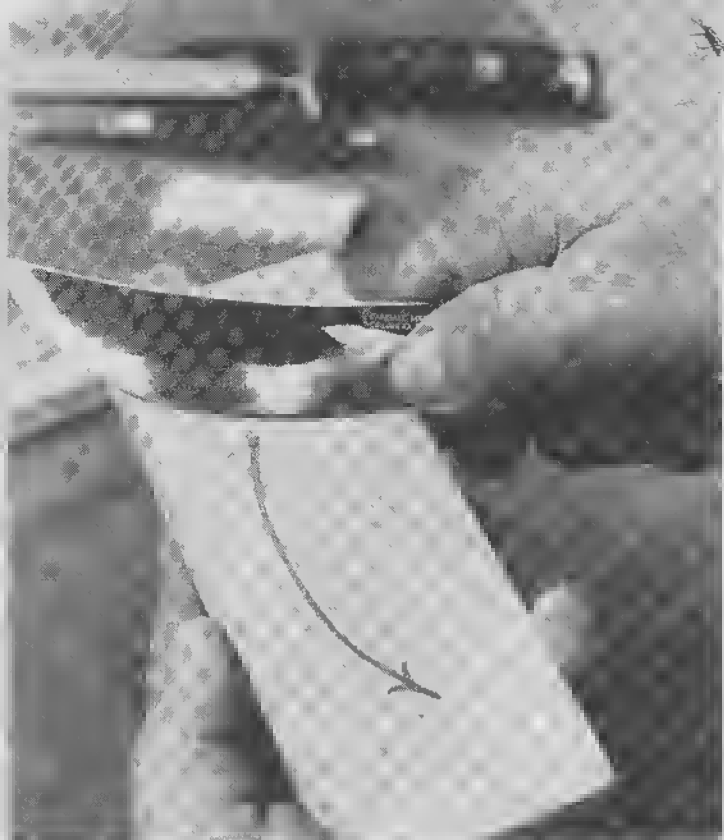
determine whether that particular knife or tool is capable of taking such an edge, then holding it after prolonged use. There are some highly touted pocket and hunting knives, as well as tools, on the market today that cannot be sharpened on a good stone simply because of the inferior steels used or improper tempering. How often have most of us tried to sharpen a knife only to watch the seemingly sharp edge roll over and crack off of the blade completely? Any good, properly tempered piece of cutlery steel will take and hold a good edge, provided it is honed properly for the job that is intended.

A knife meant strictly for game skinning purposes will have a different angle to the cutting edge than will a knife meant for hacking tent stakes or cutting firewood. For most purposes, a cutting edge of about twenty degrees will serve





Necessities for maintaining an edge on any cutting tool should include an array of good oil stones and a can of honing oil, although even saliva can be used in lieu of oil in an emergency. There are numerous manufacturers.



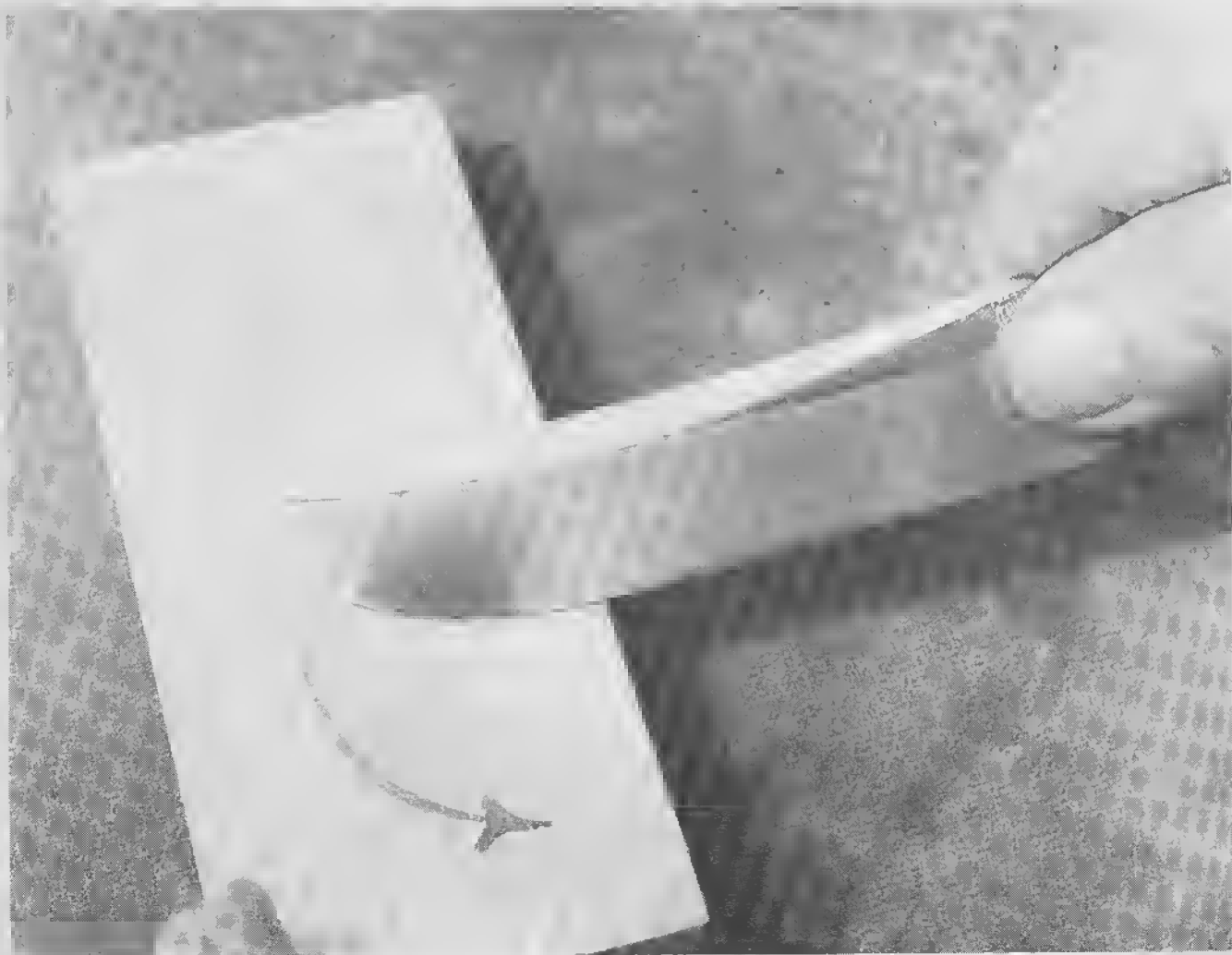
equally for skinning and all-around camp use. The so-called thin, razor-sharp edge may serve on a skinning knife, but will dull rapidly under all-around use.

The next consideration is the abrasive oil stone itself. While there are any number and types of such stones under various trade names, some of the best I've ever used were those that originate in the state of Arkansas and naturally are known as Arkansas sharpening stones.

Among the best of the Arkansas stones are those available from most gunsmith supply houses. These are available in all sizes needed for gun work, from pocket and pack stones, up to large bench and workshop stones up to a foot in length by 2½ inches in width and an inch in thickness.

Let's consider the knife that has seen long neglect and is dog-dull. A blade in this condition must be worked across the stone considerably longer than one that has merely lost

Left: The sharply curved edge of a skinning knife must be drawn across the stone in a continuous sweeping motion. This is repeated on both sides of the blade. (Below) Abruptly curved points of skinners require special treatment to assure a keen edge. It is this section of the blade that receives the greatest use.



its keenness under normal use. Each side of the blade must be given an equal number of strokes across the stone to maintain a perfect edge.

This is best accomplished with the use of a Washita soft Arkansas stone, pressing the blade firmly to the stone's surface during the initial stages of honing, then lightening the pressure as the edge is formed on each side of the blade. Finally, the blade is drawn lightly, in an even number of strokes, across the stone until it attains an edge that is sharp.

It is all important that a twenty-degree angle be maintained on the cutting edge of the blade during the entire stoning operation. Maintain this angle from the point of the blade all the way back to the rearmost portion of the cutting edge and on both sides of the blade. Sharpened in this manner, the blade should require only minor touching up with a few licks on the stone during the course of most skinning jobs on medium and big game. However, if you want your knife to maintain a keen edge, never attempt to hack through heavy bone. This is a job best left to the camp ax.

Basically, the same procedure outlined above will serve equally well on most folding pocket knives. There are any number of custom-made knives available to the sportsman today that can be sharpened to the point that the blades will skin out several head of medium or big game without needing a touch-up on a stone. And many of these makers furnish fine oil stones with each knife. Regardless of how good

it might be, any knife should and must be touched up occasionally on a good Arkansas oil stone.

Important to the sportsmen, who repair or even build part of their outdoor gear, are the various cutting tools, such as wood chisels, planes, gouges and other edged tools used regularly in their home workshops. Tools of this type are especially important to those who build or rebuild sporting rifles as a hobby.

The inletting of a rifle action into a semi-finished stock is one of the most exacting chores in building a custom rifle. With the proper tools, this same job can be done quickly and easily by anyone familiar with the procedure. However, if those same tools — chisels, in this instance — are dull, this job can be one that will turn hair gray and cause no small amount of perspiration to drip and flow! Sharp inletting chisels do a beautiful job, while dull ones can cobble the stock into something fit only for firewood!

The basic procedure of knife sharpening is used on any flat chisel — with two exceptions. First, the cutting edge of the chisel must be kept perfectly straight, while the original degree of angle of the sloping edge, as factory ground, must be maintained.

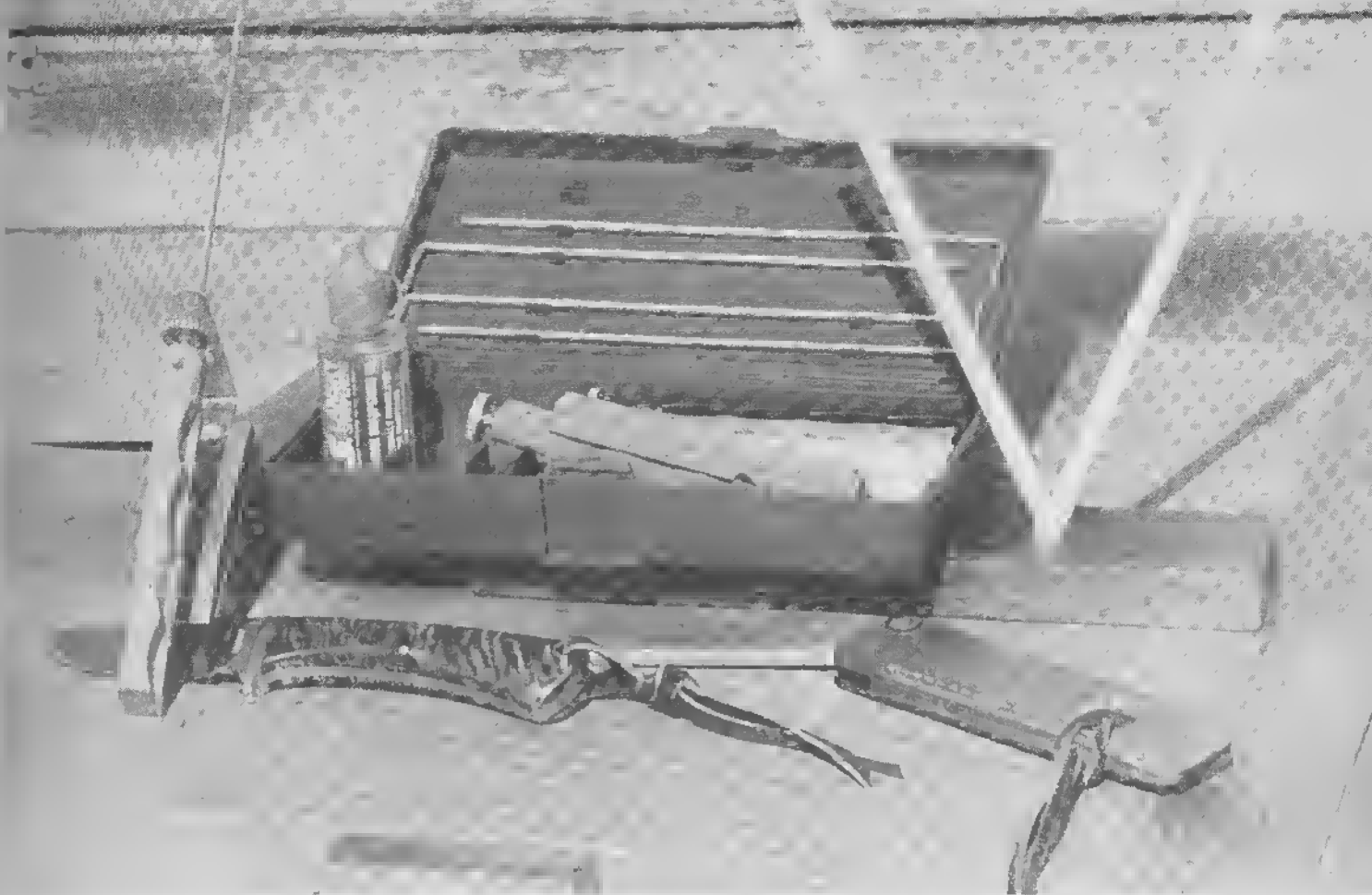
The sloping edge of the chisel is placed on the stone at the correct angle, then the cutting edge is pushed the length of the stone in one continuous motion. This is repeated until any minor nicks and roughness are removed from the edge. Then the pressure on the chisel is lessened to assure a

The author has discovered that a good wood chisel can be kept sharp by honing the beveled edge at a correct angle.





Once the desired edge has been attained on the blade, a finer grit stone can be used to remove roughness or burrs.



Manufactured today is a wide variety of sharpening tools. At right are Crock Sticks, made of ceramics, providing the correct angle for sharpening both sides of blade. At bottom is folding sharpening steel offered by Gerber Blades. The rather complex kit is from Lansky Sharpeners, which offers stones in various grits and jig for holding angle.

perfect, flawless cutting edge. The last step is to turn the chisel over, lay the flat surface of the chisel blade onto the stone and lightly work the cutting edge in a sideways motion to remove even the most minute burrs. The final touch upon the chisel is made with an Arkansas hard stone to assure a super, razor-sharp cutting edge. The blades of wood planes are sharpened in exactly the same manner.

Any new knife — unless it is custom built and honed — must be stone sharpened the minute it is purchased, if complete satisfaction is expected.

It is best never to skimp on price where a knife is concerned and this applies to shop tools, too! But the most important thing to remember when buying a knife is also to have a good oil stone with which to sharpen it.

In addition to Arkansas oil stones, there also are excellent oil stones produced under the name of Carborundum and Norton Abrasives. But regardless of the name, a good quality oil stone should be in the tool kit of any gun craftsman and with the sportsman in the field.

In recent years, there have been some new gimmicks introduced specifically for knife sharpening. One is the so-called crock stick, which is made of ceramic. It usually is furnished with a block with holes drilled in it at a precise angle. The ceramic rods are inserted in these holes and this gives the preferred twenty-degree angle for sharpening. It can be effective, if used properly and the person doing the sharpening is careful to maintain the required angle.

Arthur Lansky has come up with a sharpening unit that is somewhat more complicated. It features a small vise for holding the blade in a fixed position, then rods attached to stones are inserted in a series of holes that give one a specific angle ranging from seventeen to twenty-five degrees. But one has to know at what angle the knife was sharpened originally for best results.

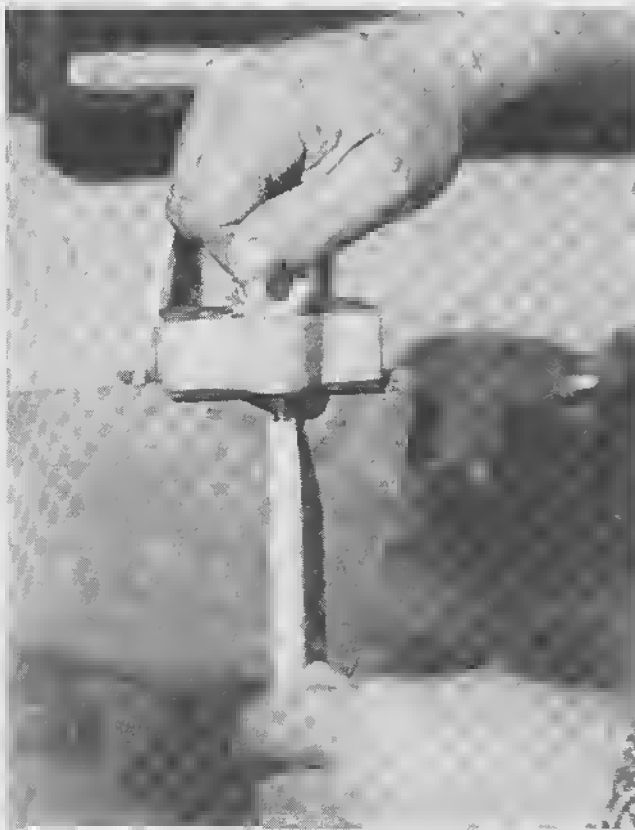
Most of today's major cutlery manufacturers, including Buck Knives, Western Cutlery, Gerber Legendary Blades and Camillus Cutlery also market knife sharpening kits of one kind or another.

Chapter 13

THING ON A SLING

Properly Installed Swivels Can Mean The Difference Between A Good Hunt And A Dreary Hike!

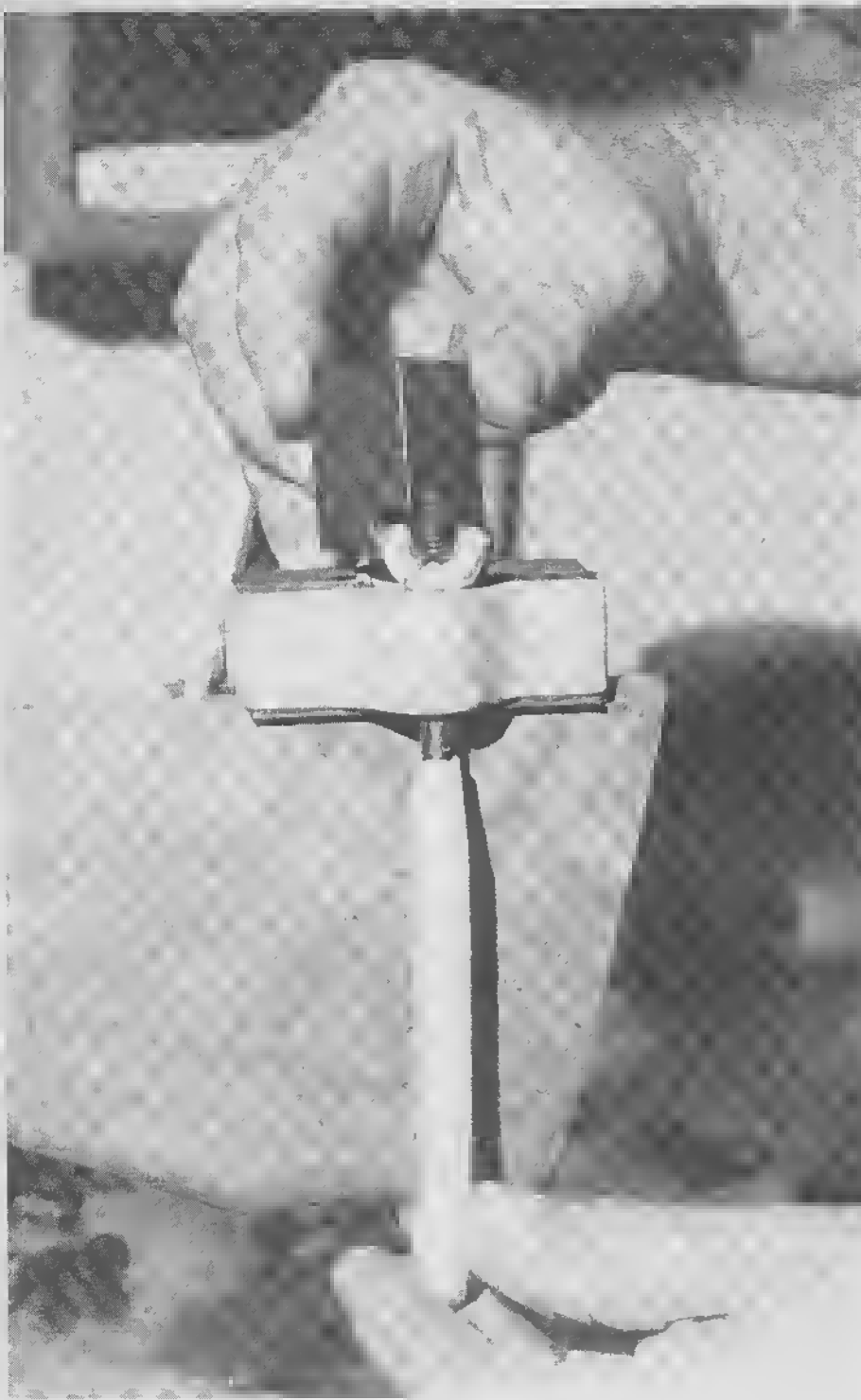
Left: Anything from a length of rope to a torn strip of cloth from an old shirt can be used to carry a hunting arm, but for comfort and pride of ownership, an easily installed sling and swivels can make a difference. (Below) Pachmayr Economy swivel fixture is installed on the butt near the toe of the stock. When it is positioned correctly, the hole to accept swivel can be bored.



ONE CAN spend hours poring over literature concerning almost every phase of what might constitute a well built sporting rifle. However, in my years of gunsmithing, particularly in the field of rifles, I have yet to read one comprehensive narrative on perhaps the most important items that can — and should — be installed on any hunting rifle or shotgun. This seemingly insignificant component is the simple sling swivel!

In most writings concerning rifle descriptions, the sling swivels are sluffed off with mere mention. As a rule, no information is given as to type, size or method of installation, whether it is a detachable European type, push-button detachable, a sweat-on type or one of the sets installed with two screws.

There are numerous types, designs, shapes and sizes of sling swivels available. Some are excellent, while others would be a disgrace to install on even a fairly good rifle or shotgun. Good-to-excellent sling swivels can be purchased today for only a few bucks — a pair for the permanent installa-



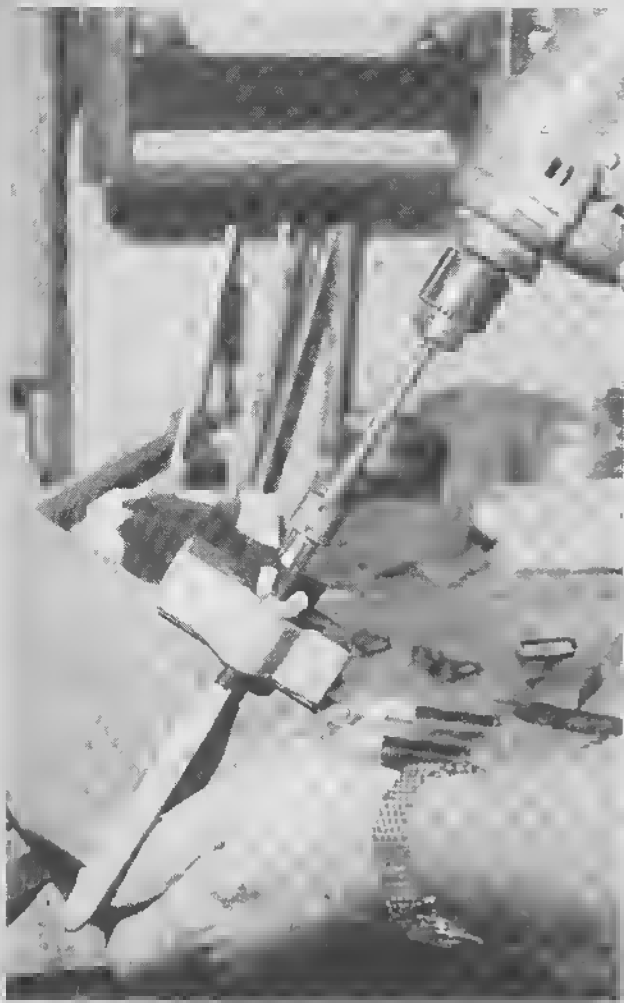
Author determines how the cutter bushing should be inserted in the fixture, taking care that contoured side of fixture is against stock.

tion type. For a few dollars more, one can have a pair of Uncle Mike's Super Swivels. The bases for these Super Swivels vary according to the type of rifle or shotgun they are to grace. The basic reasoning in selecting a set of sling swivels depends upon how dearly you value your pet hunting rifle or shotgun. Personally, I want only the best for my pets.

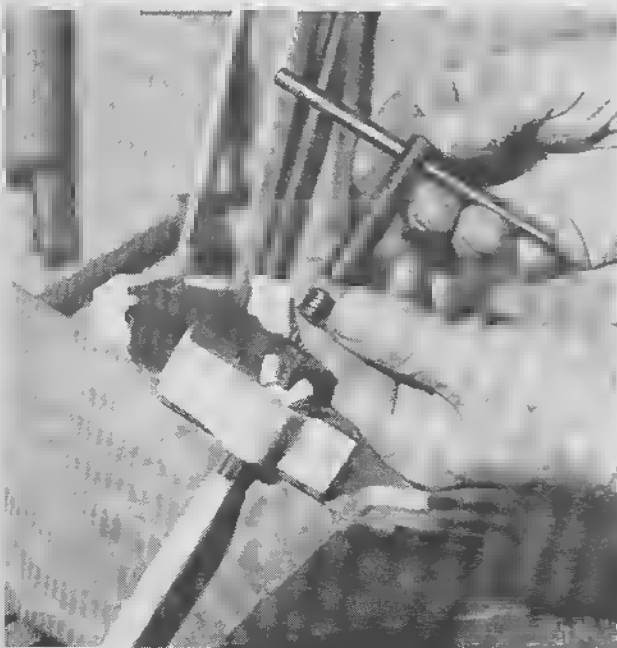
Detachable swivels are available in several distinctly different styles, which include the push-button, the cross-bar type and the European style. An innovation in sling

swivel types has been recently introduced with the Pachmayr flush sling swivel.

This is the first major innovation in swivels in many years. It is entirely self-contained and requires no push buttons, springs or hard-to-get-at levers for dismounting from the gun's stock. This swivel, once installed, can be attached or detached from its base by a mere twist of the wrist. Yet it is fool-proof and will not detach itself from the bases under field use. The basic feature of the Pachmayr flush swivel is what the name implies. With the swivel



The cutter is chucked into a drill motor, then inserted in guide hole of bushing and the hole to accept swivel base drill. Cutter is factory set for the proper depth. (Below) Remove bushing, reverse ends so the notched ends are outward in fixture. Insert swivel receptacle into hole in stock about three full turns, using T wrench.

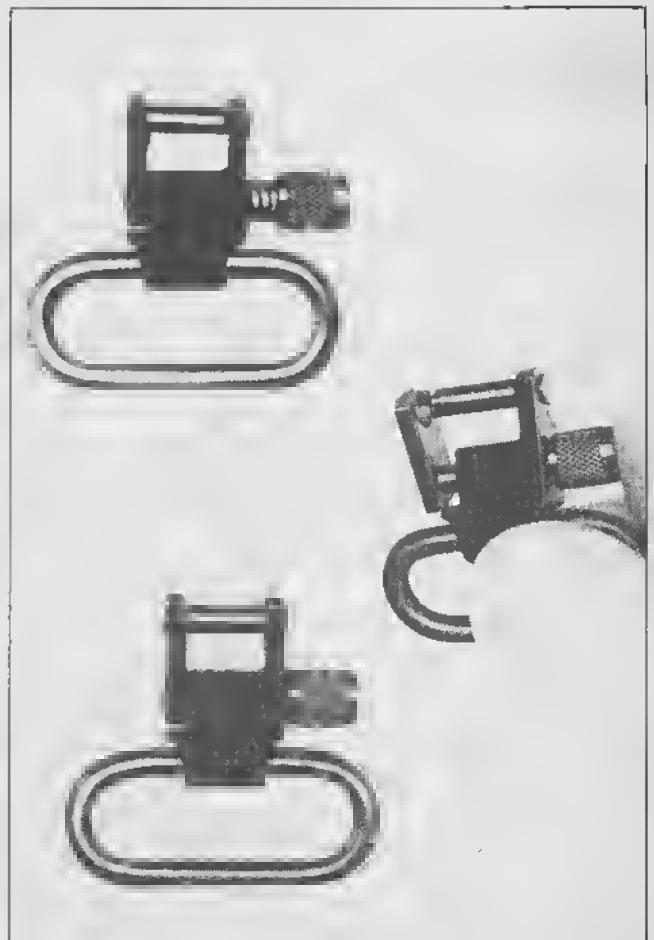


removed, the base sits flush with the surface of the stock, offering no projections or steel lugs that can often prove exasperating for obvious reasons.

For the gunsmith with a number of swivels to be installed, Pachmayr has designed a fool-proof installation drill fixture, which clamps to the stock or forend, providing a perfect guide set-up for drilling the holes to take the swivel receptacle. This drill fixture is complete with everything needed, including the cutter for the swivel sets found in the Pachmayr lineup. These swivels are available for most sporting rifles, including those with a barrel band, such as the '94 Winchester and various pump-action and semi-auto rifles.

One of the most popular sling swivels for many years has been the so-called European detachable type. These swivels are installed easily, have proved themselves reliable in the field and are plenty rugged. Swivels of this type are available from gunsmith supply houses such as Brownell's,

At top of photo, Michaels Super Swivel has the knurled sleeve unscrewed. (Center) Depressing the plunger will open the swivel gate. (Bottom) Swivel is locked shut.



Michaels of Oregon or Williams. Various models of these swivels are adaptable to most American and European rifles and shotguns. Some marketed exclusively by Michaels of Oregon are designed to fit a wide assortment of replica muzzleloading rifles.

At the time of this writing, Michaels of Oregon has unveiled a new revolutionary design. Known as the Super Swivel, this new product has all the features of the finest

European-type swivel, but includes an all-new feature in that the swivel can be locked in place by a threaded mechanism within the swivel itself. This feature eliminates the possibility of the swivel being accidentally opened, thus providing extra security under rugged conditions.

Other detachable sling swivels — which I have used in the past — are those produced under the trade name of Uncle Mike's or McKinzie Michaels. These swivels oper-

After boring hole to accept receptacle, cutter is removed. The sling swivel base — or receptacle — is screwed into place in the stock with care. Special wrench is furnished with Pachmayr kit for this.



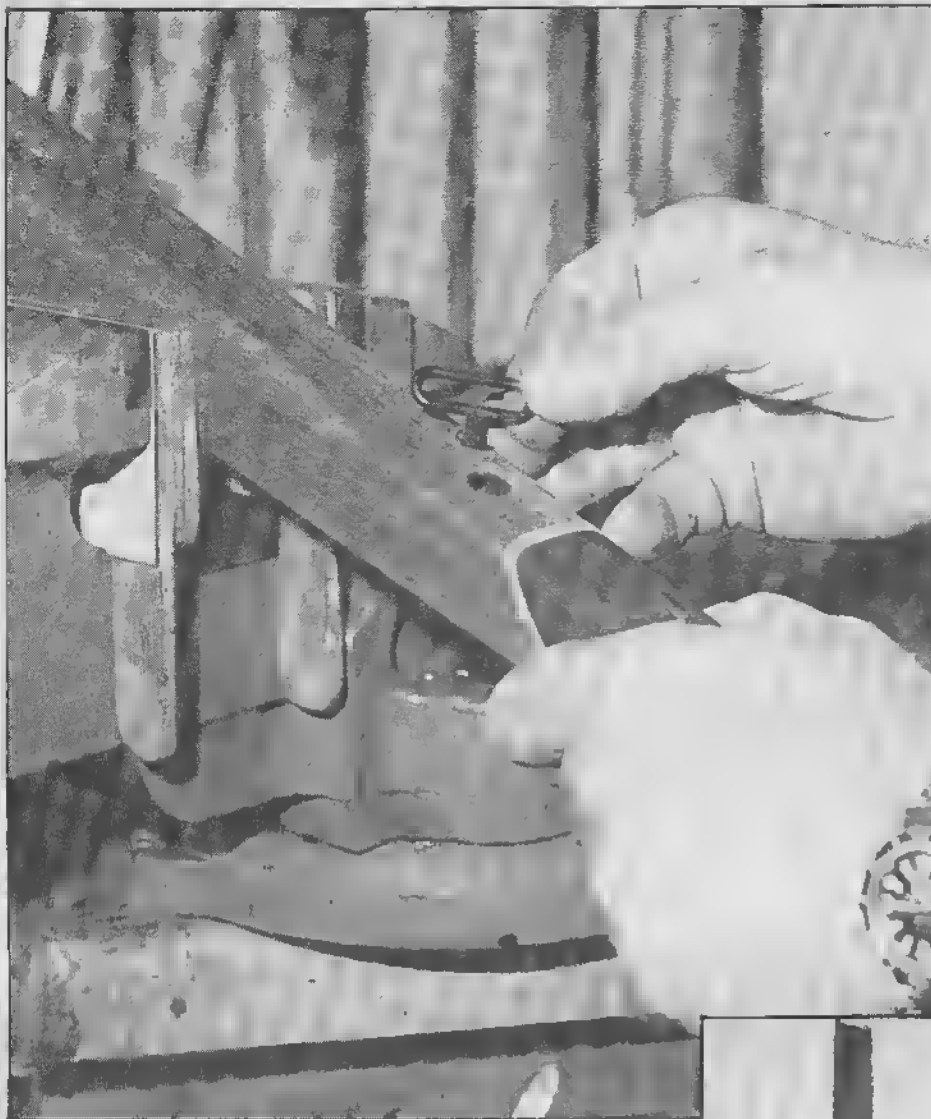
ate on a ball bearing principle, the bases installed absolutely flush with the stock's surface. This eliminates that protruding stud. The Michaels' swivel is detached from its base by pressing the circular button located in the center of the swivel base proper. This allows the steel ball bearing to retract, freeing the swivel from the base. On the order of the Pachmayr flush sling swivel in appearance, installation of the ball bearing mount differs slightly in that a screw holds

the base in place in the stock. The bases of the Pachmayr versions are equipped with their own threads, eliminating screws.

The Philips detachable swivels are good, rugged items. While the mode of detaching is not as refined as for some more expensive models, it is a simple operation to turn the threaded shank of the swivel proper a few turns to free it from its base. However, with this type of swivel it would be



With previous steps completed, the swivel then is inserted, turned to the lock position.



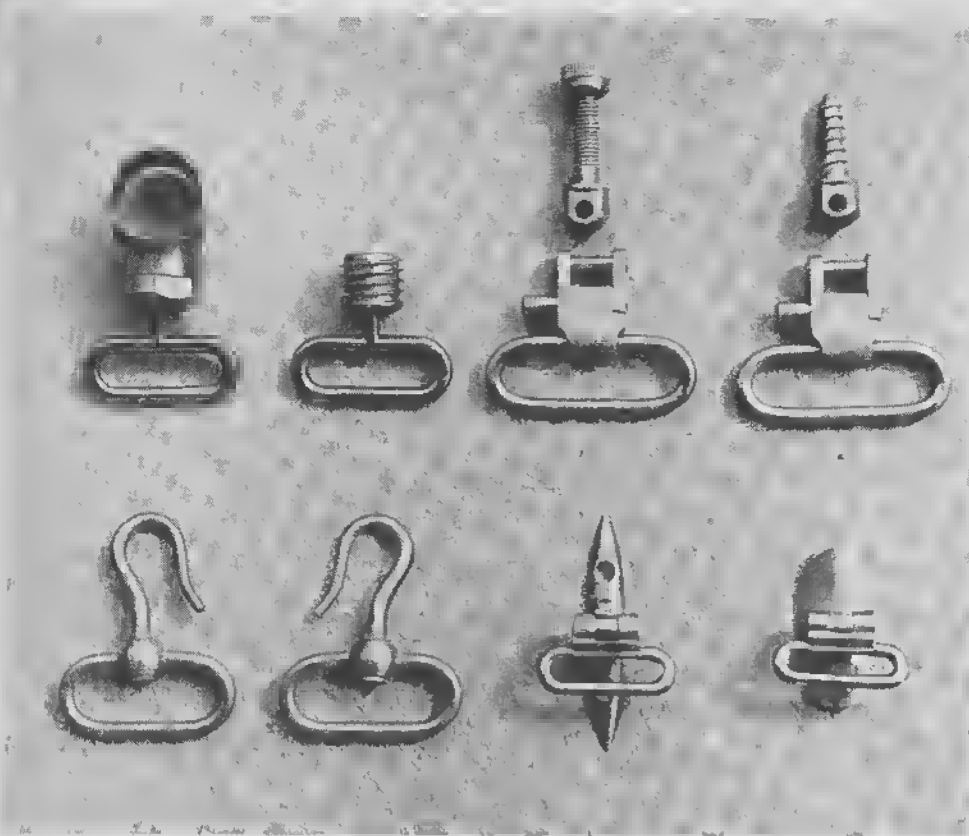
Completed installation of flush swivel and receptacle presents a neat appearance, yet is rugged. (Below) Forend swivel should be installed in same basic manner, but the smaller U-bolt should be used during the initial drilling.

well to have handy a small screwdriver, or even a ten-cent piece to fit the slot cut into the swivel screw.

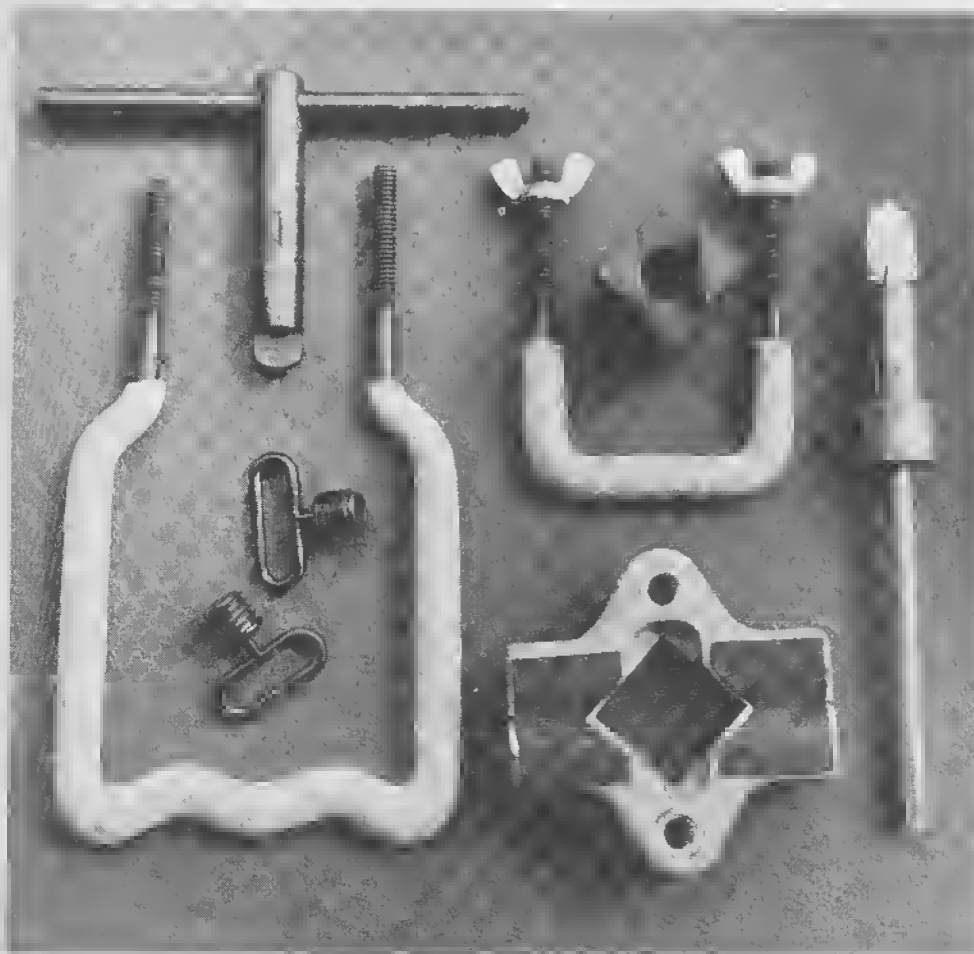
A great number of gun owners have the misconception that sling swivels are available only for those rifles having a solid forend, such as Mauser and Springfield sporters and the various sporting models by Winchester, Remington and infinitum. Sling swivels by all of the makers mentioned are available for such rifles as the various lever actions by both Marlin and Winchester having tubular magazines, the Model 740 Remington, with barrel stabilizer; the 760 Remington; 742 Remington; the Models 64 and 95 Winchester; Models 36, 36-A, 336 and 336-A Marlin with either long or short magazine; most popular shotguns such as the Ithaca Model 37 and 37-DS; Remington nylon models, 725, 1100; and others. The Savage Model 24 over/under and the Winchester Series of 200 and Model 100 may be fitted with swivels especially designed.

Proper installation of a swivel on a sporting rifle can





Of the many types of sling swivels available, this is a popular representation. (Top, from left) Pachmayr flush system for tubular magazine rifles; European detachable types. Beneath: Hook-type detachable type once made by Savage Arms and detachable European versions made for use on shotguns, double rifles.



Pachmayr installation kit includes all components to install both butt, forend swivels. Six components include butt and forend U-bolts, drill, a drill bushing, drill guide and T wrench. This unit can be valuable if working with several different types of modern swivels.

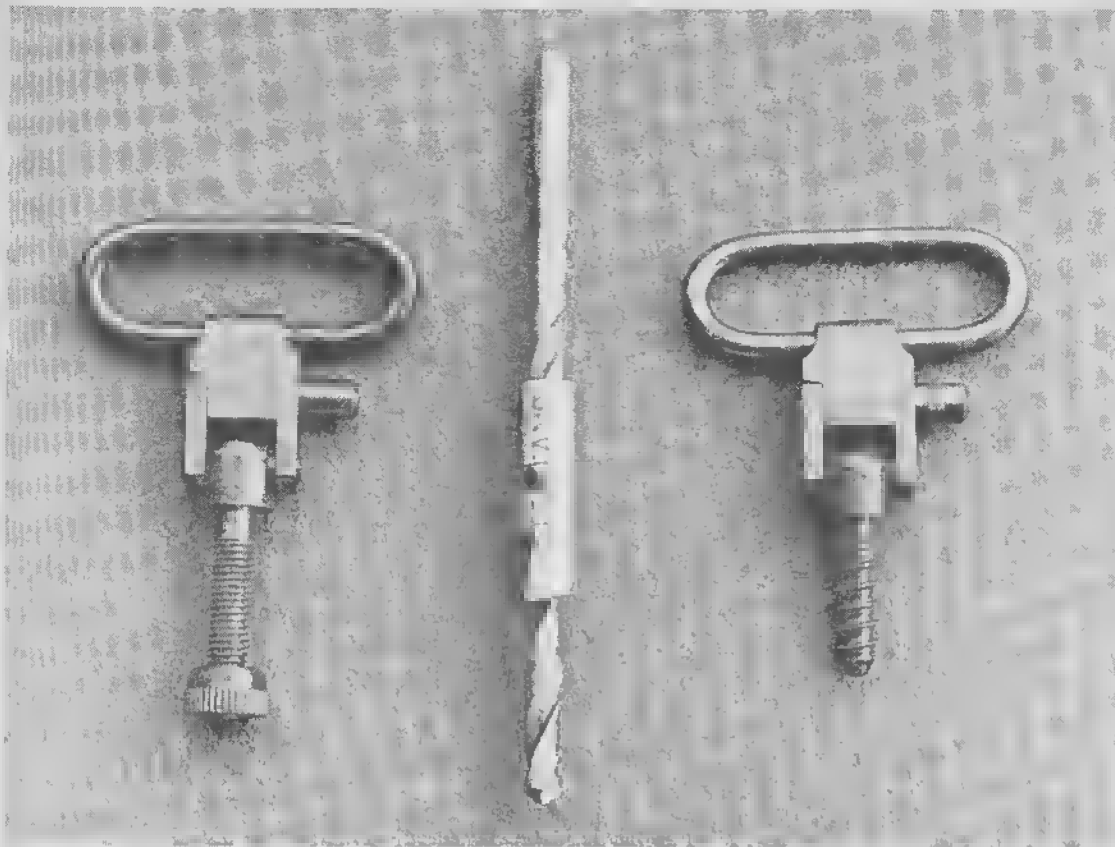


Author contends that good swivels deserve a good sling. This Latigo Quick-Set sling is from Brownell's. This is a good, rugged sling that should afford user years of hard service.

make the difference in whether that rifle is carried with ease or merely lugged around by a leather strap. To place the swivel too near the toe of the stock could weaken this portion of the stock. Installing it too far up the stock could result in poor carrying qualities and possible interference with the operation of the rifle's action. Placement for the butt swivel usually is $3\frac{1}{2}$ inches up from the extreme toe of

the stock or recoil pad. Exact center of the curvature is determined and marked with a sharp scribe. The drilling is done here to accept the swivel screw or, in the case of the Pachmayr flush sling swivel, the swivel receptacle.

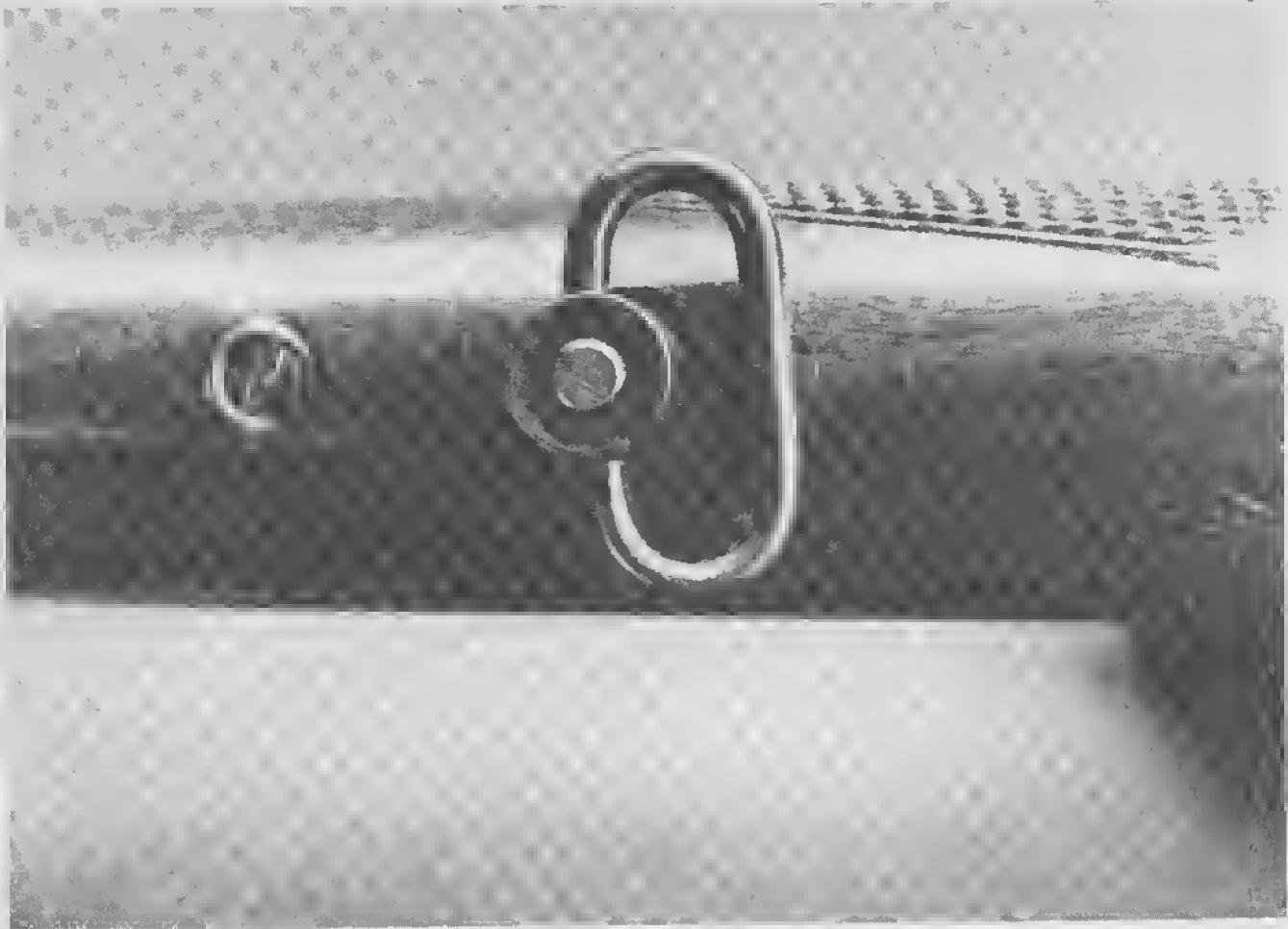
Using a steel drill of the correct size, a hole is drilled to accept the full length of the swivel screw. This hole then is counter-bored to a depth of about one-quarter-inch to



Installation of European-type detachable swivels is a minor chore with the right equipment. Step-drill shown is used to install forend swivels, as explained here. The swivels on this page are from Michaels of Oregon.

McKinzie quick-detachable swivels are equipped with ball bearings and are both neat looking and rugged; a push-button facilitates removal. Proper installation, though, needs careful workmanship. This one has been mounted on Savage 99 forend.





To activate the McKinzie swivel, it is necessary only to push the round button located at swivel's center, then pull out the base. These swivels are available from both Michaels of Oregon or Brownell's, Montezuma, Iowa.

accept the full, unthreaded size of the screw's shank; therefore the drill used in counter-boring must be the same size as the screw shank to prevent chipping of the wood around the hole, when the swivel screw is tightened in place. Initial boring of the swivel screw hole should be sufficient to accept the threaded section of the screw in a tight fit, assuring that the screw will not pull out under strain.

Correct placement of the forend swivel on a conventional half-stock or Mannlicher-type sporting rifle will vary with barrel length, stock design and other factors. However, about eight to nine inches forward of the front edge of the receiver ring should prove to be about right for most rifles. This will place the balance of the rifle at the right position for carrying ease once a leather sling is installed. Installation of the front swivel is basically the same as that of the butt swivel insofar as drilling is concerned. However, in most cases it is necessary to counter-

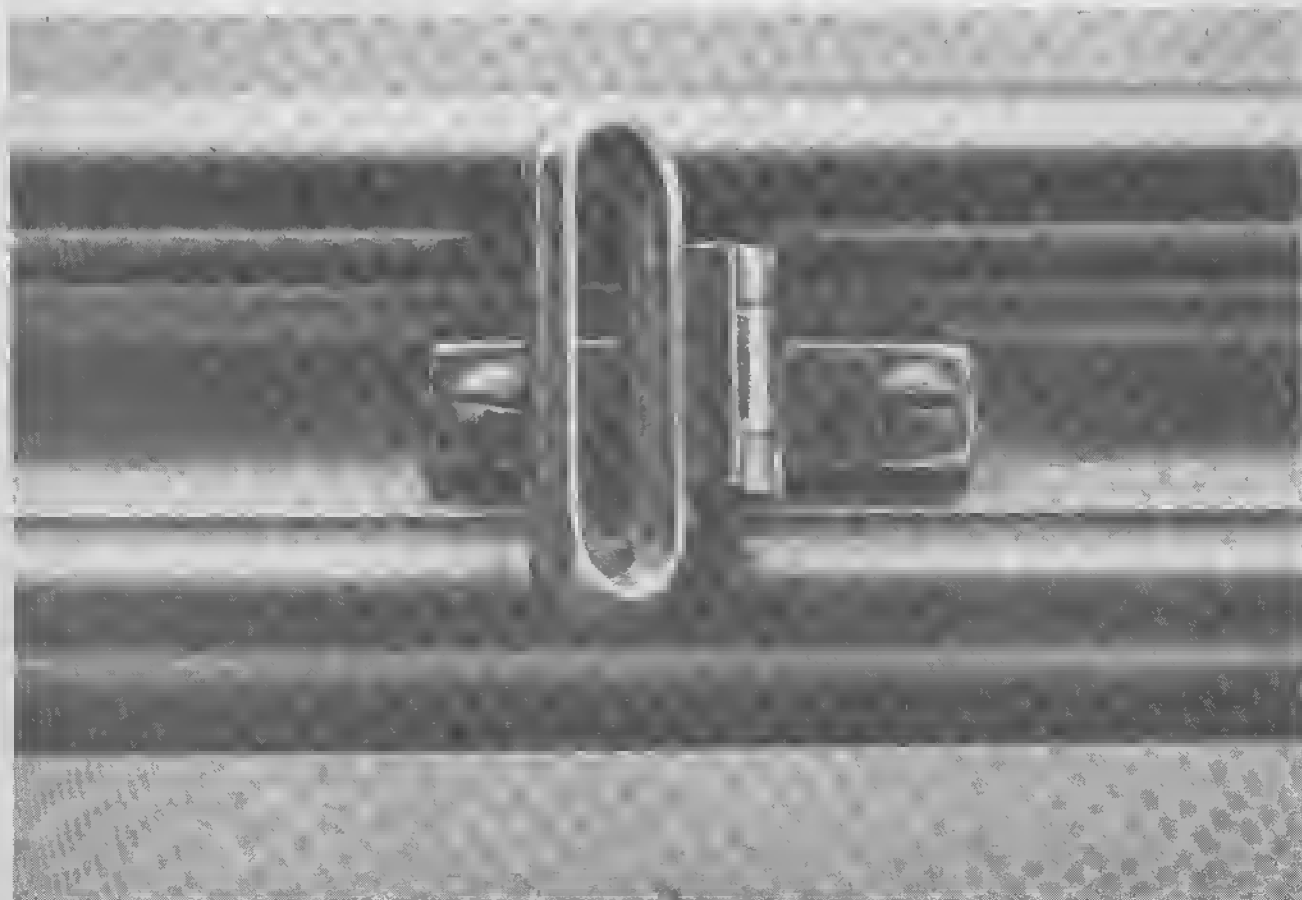
bore the barrel channel of the stock to accept a lug nut which will hold the swivel in place. Counter-bores for this purpose are available from Williams Gun Sight Company.

Most sling swivels are available in two sizes, 1- and 1 1/4-inch to accept the two standard widths of sling straps. With such sling straps as the Cobra manufactured by Bianchi, I have found that the smaller swivels are about ideal. The strap tapers from one inch at the top into a comfortable width just right to fit the shoulder correctly; then it gradually tapers to the butt swivel. This type of sling strap is most comfortable and, when securely attached to a good pair of sling swivels, it can make the carrying of an otherwise heavy hunting rifle almost a pleasure.

The lowly sling swivel is one of the most important features of any good rifle. Without them, even a good hunt could be a dreary affair indeed!



The European non-detachable swivels are found on many rifles, shotguns and double rifles. Most are made to take a three-quarter-inch strap. (Below) Barrel swivels are available through importers to fit most shotguns and double rifles. Some of these are installed by means of screws, while others are sweat soldered in position.



Chapter 14

A WELCOME SIGHT

Installation Of A Bright Insert On Your Ramp Front Sight Can Improve Your Shooting!

ALMOST ANYTHING IS possible in the way of converting, altering or general customization of nearly any reasonably modern firearm to turn it into a more worthy sporting or target gun. Some guns aren't worth the trouble or expense due to their age, the materials used in their manufacture or obsolescence of the action itself.

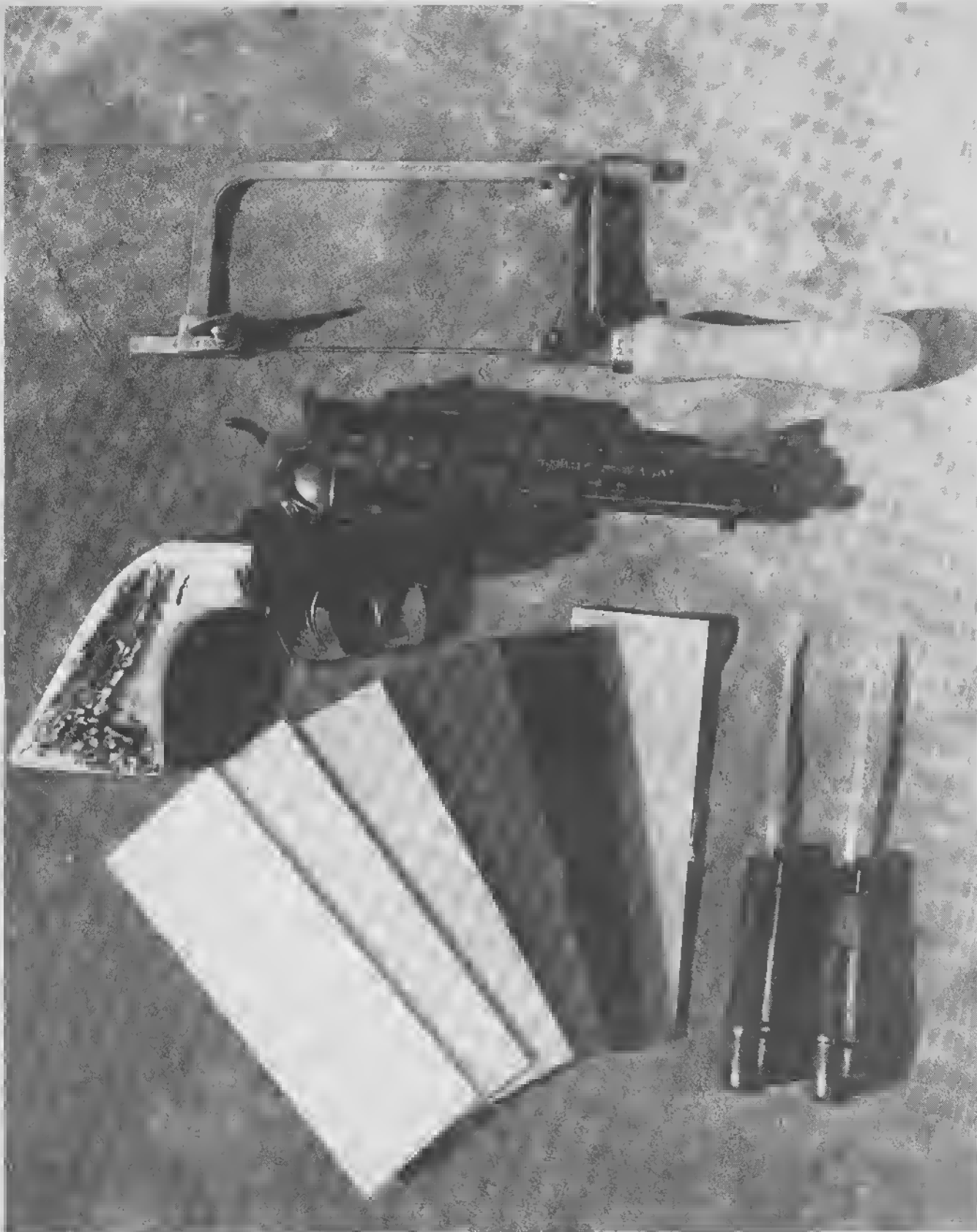
There also are modern, factory-built sporting arms of quality that can be improved to some extent to meet the needs of each individual.

One of the least-attempted improvements to a firearm is the alteration and improvement of sights. The exacting art of correct sight installation on a particular rifle or handgun can be perplexing, but there are several ways in which



Initial cuts in the front sight are made with jeweler's saw or fine-toothed hacksaw. Each cut is made at a 45-degree angle. Keep the top cut as close to the top of the sight blade as it is possible for you to do. (Right) Final chore in project is final finish of the insert. This is done with a 400-grit paper. A high polish may be attained with Simichrome paste, but guard against any glare.





Tools needed for installing the sight insert are minimal. A jeweler's saw, a three-cornered Swiss needle file and a sight base file are required, with parallel action pliers needed to press insert into the newly cut slot.

sights can be improved for target shooting and hunting purposes at little expense.

This narrative won't go into the intricacies of inlaying elephant ivory to outline the aperture of a rear sight nor dwell on such complications as building a folding ivory-beaded night sight of the type used in India for night tiger hunting. Instead we will investigate a fairly simple method of improving an already superlative front sight blade.

The front sight and its prominence when properly aligned in the aperture of the rear sight can make all the difference in whether the hunter goes home with meat or the target shooter places all his shots in small groups in the ten-ring.

Those who have hunted game animals in the early morn-

ing or at dusk, when shadows are long on the hillsides and in the timber, know that without the proper sights hunting is almost impossible. Iron sights, either black or gun metal blue in color, blend so perfectly with hillside and timber shadows that they often become all but invisible against the shaded background. This all too often results in impossible sight pictures and lost game. The same can be true whether hunting with a rifle or handgun.

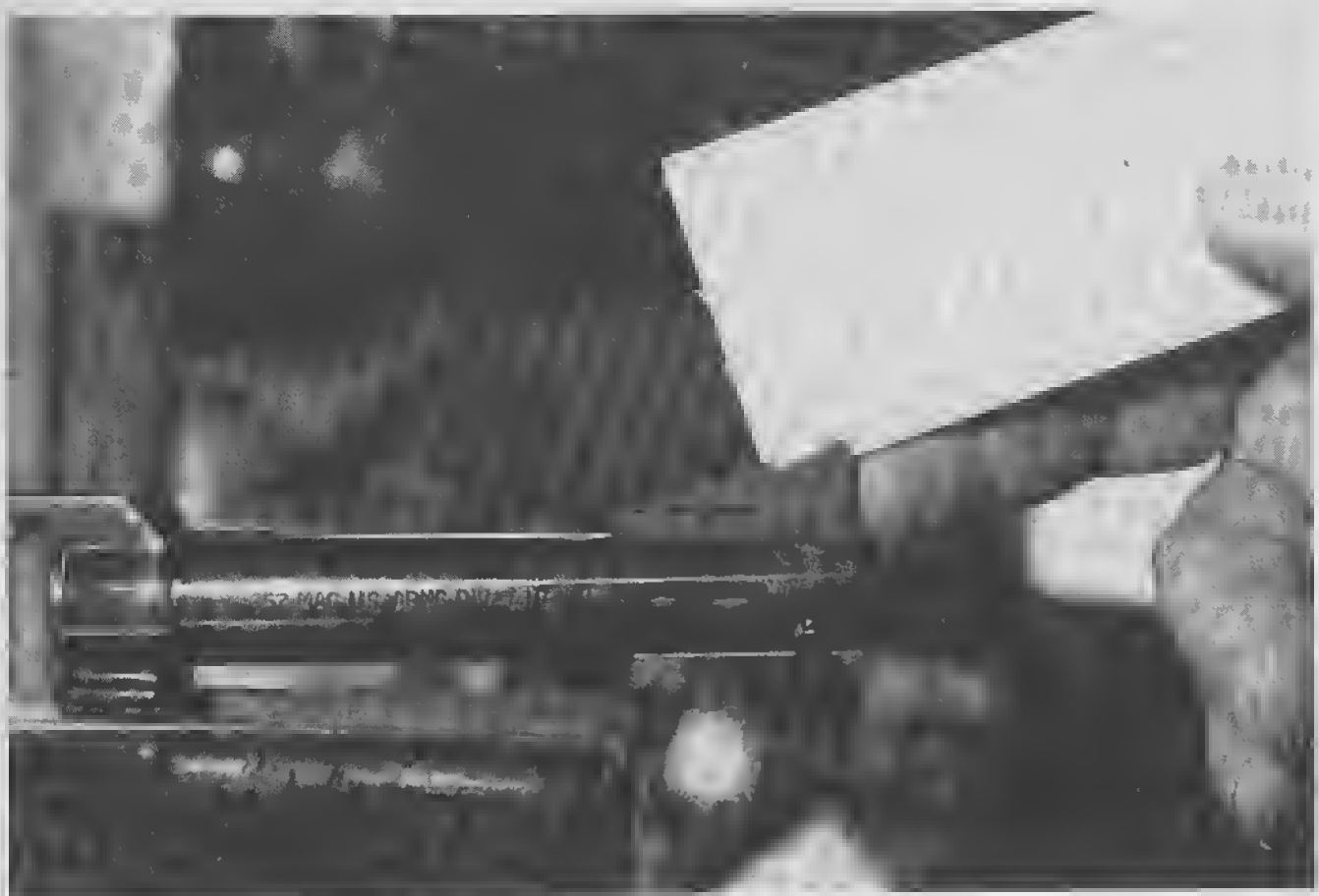
The majority of handguns manufactured today are equipped with sights designed for use under bright, daylight conditions. Under shadows or at night, they can become all but useless. Over the past several years, I have installed any number of sights that could be seen, even at night, on handguns used on night duty by police officers.



With three-cornered Swiss needle file, slot to accept the insert is filed to depth of about 1/16 inch, then it is under-cut at each end. Make certain the surfaces are filed straight, flat.

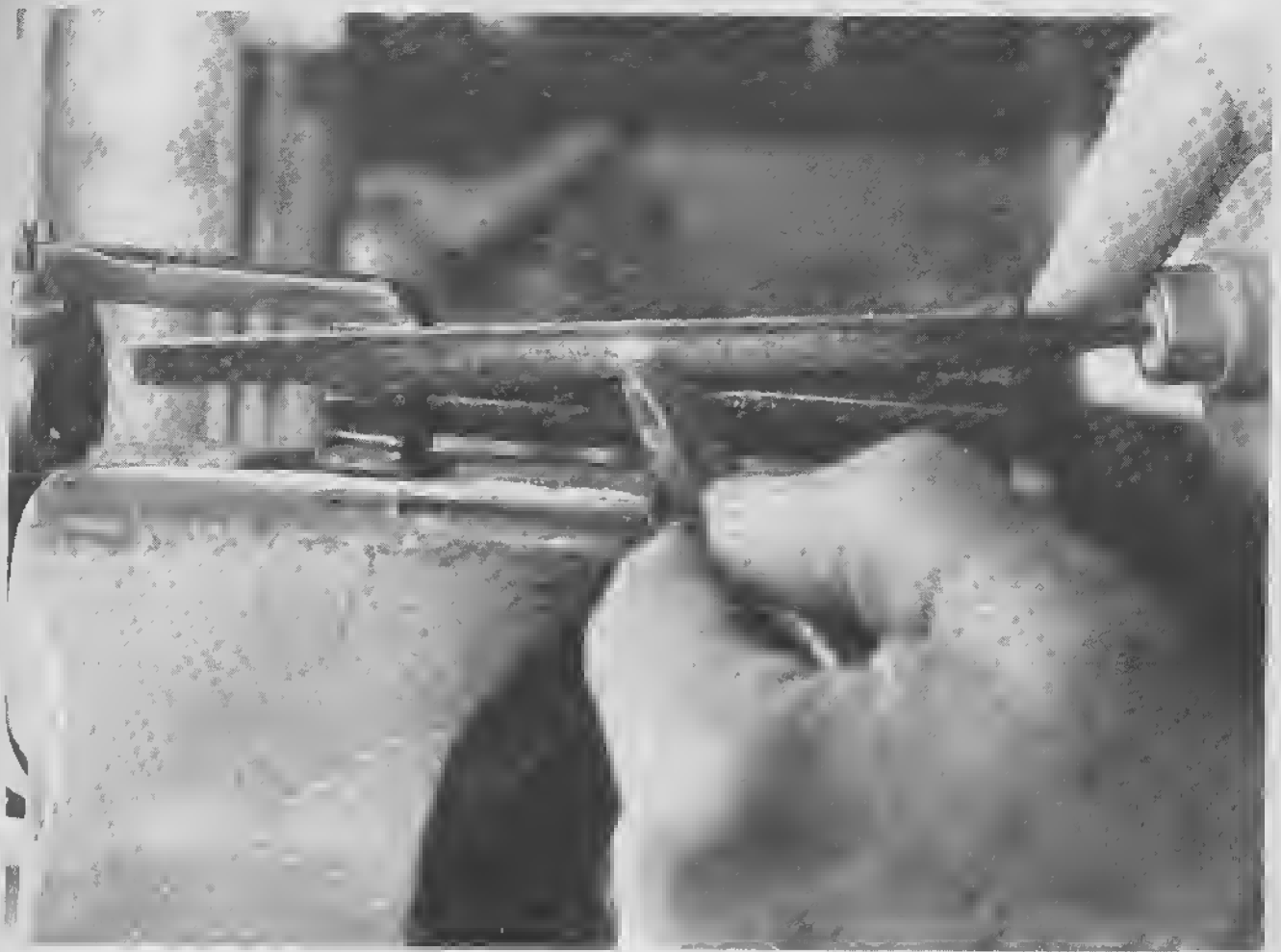


With the use of a sight base file, the area to accept the insert is finished with care to ensure an exacting fit.



*A small section of the insert material is measured, adding a trifle of the length for final fitting in the new slot.
(Below) The insert then is cut from the sheet of material, using great care, with the sharp-toothed jeweler's saw.*





Using a file with fine teeth, file the base of the insert until it is perfectly flat and straight. The ends of the insert are then filed at an angle to match the slot in the sight blade. It is necessary to leave the ends slightly longer in length than the cut in the slot in order to provide a tight slide fit of the insert into the slot.

With a little horse sense and careful workmanship, a handgun can be improved in the sight department. But should shoddy craftsmanship be employed in this otherwise simple operation, it is possible that the barrel of the gun will have to be replaced.

Colors such as blue and green never have been used as beads on gun sights. These colors, like black and gun metal blue, are lost, when one is aiming at a hillside covered with green brush or timber. The most satisfactory colors for front sight beads are white (mostly used on shotgun beads), brass, gold, bright red or orange.

In recent years, a profusion of plastics have appeared on the market having a phosphorescent quality. While plastics of this type may seem difficult to obtain in some areas,

a little basic research shows that this material is available in most drug stores in the form of toothbrush handles. The most appropriate color for gun sight purposes is bright red. One such toothbrush handle is enough material for literally hundreds of the type of front sight bead being explained.

While a complete front sight insert kit is available from Brownell's, we will deal with the possibilities of the home craftsman doing the job with materials readily available. Should he want to do several such insert jobs, then the Brownell's kit might be the answer.

Let's assume that the handgun on which the sight bead is to be installed has a ramp-type front sight holding a sloping blade. First, clamp the handgun securely in cork-lined vise-jaws, preferably by the barrel. Careful measurements

then are made to determine the exact length of the bead inlay. One-quarter inch in length is about right for most handguns, with less, if the slope of the blade is more abrupt.

In this instance, the Mossberg Abilene single-action revolver was chosen as the handgun on which the colored insert would be installed for better sighting.

For those who may not be familiar with this particular model, it is being manufactured in .357 magnum, .44 magnum and .45 Colt calibers. It has a six-round cylinder and is available in barrel lengths of 4½, 6, 7½ and 10 inches. Features include smooth walnut grips in the traditional style, a wide hammer spur and it is available in blue or what's called a Magnaloy finish.

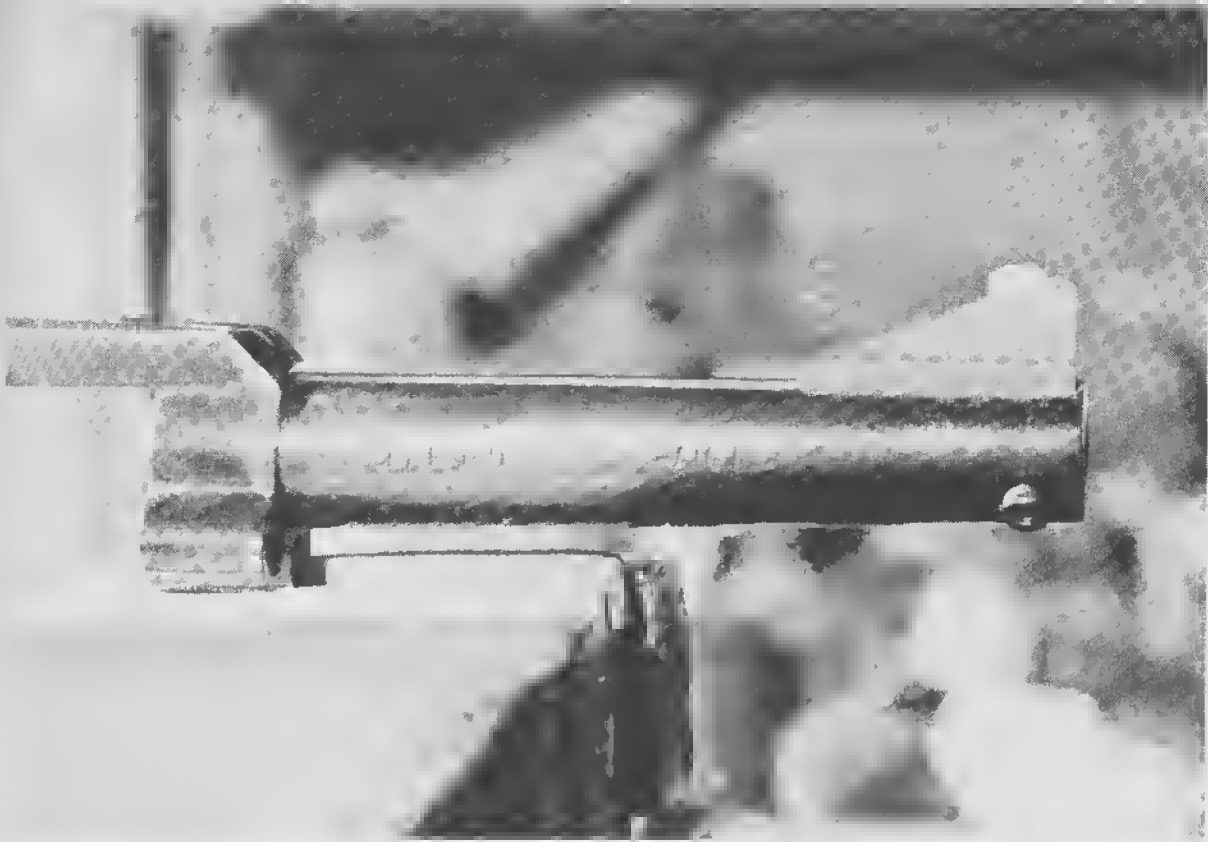
But the parts of interest to us are the sights. The rear sight is click adjustable for windage and elevation. And the front sight on which we will be working is a serrated ramp style.

A small, three-cornered Swiss needle file is used to file a notch one-sixteenth inch deep by one-quarter inch in length. This notch is filed perfectly square with the sides of the sight blade, then is undercut at each end. The uppermost section of the dovetail should be as near the top of the sight blade as possible to retain proper sight alignment of both sights.

To lower the front sight by filing away excess metal above the bead inlay will result in the handgun shooting high, necessitating adjustment of the rear sight to a lower

Using the parallel action pliers, carefully squeeze the slightly over-size insert into the sight blade's slot. Make certain it is pushed all the way in and is flush with each side of the blade for its proper seating.





At this point, the insert should be tightly in place in the slot, but extending above the radius of the sight plane. (Below) The excess insert material is filed to the surface of the metal, not filling into the blade itself.





Progress should be checked constantly with the fingers to ensure that the sides of the insert are on a perfect plane with that of the sight blade. Do not round it over. (Below) Smooth the top surface of the insert with a fine-tooth file — In this case, a sight base file — then be sure to finish lightly with 400-grit finishing paper.



elevation. The basic principle in filing out the slot to accept the plastic inlay is to keep the cut as near the top of the sight blade as possible without weakening the undercut that holds the plastic bead.

With the dovetail slot cut into the front sight blade to perfection, the next step is to cut a small section from the red toothbrush handle — or plastic sheet, if you can find one. This is filed and shaped exactly to the contour of the dovetail cut in the front sight blade. The plastic insert should be a tight slide fit into the dovetail.

Make certain that the plastic insert is fitted so that no minute gaps or open spaces are apparent to the eye around the perimeter of the plastic. Should the insert be a poor fit, make another. If you're using the toothbrush handle, you should have plenty of material for experimentation.

Once the insert is pressed into the dovetail in the sight blade, any plastic that overhangs the sides of the blade proper may be filed flush with the metal, using a flat Swiss

needle file and taking care not to scratch the steel of the sight blade. The final touch is to dress the entire surface of the plastic insert lightly with 400-grit wet-or-dry paper, then buff lightly on a loose muslin wheel dressed with white buffing compound.

Properly done, such a plastic bead should enhance overall appearance, in addition to improving the sighting capabilities. When the handgun is pointed into heavy shadows, the red or fluorescent orange front sight literally sticks out, providing a perfect sight picture. For night work, one may replace the insert with a white bead of plastic or ivory.

Plastics of the phosphoresce nature have the capabilities of gathering light where little light is forthcoming. It is the type of material from which such fishing lures as the Glow Worm and others are made.

This project is certain to be appreciated the first time the handgun is taken afield, whether in bright sunlight or when shadows are long.

When completed, the front sight insert should look like the one shown. Any minor wear to the blued surface of the metal surrounding the insert may be touched up with cold gun blue solution to hide any signs of this type damage.



Chapter 15

INLAYING MADE EASY

The Author Takes The Mystery Out Of This Means Of Adding Personal Touches To Firearms

VIRTUALLY since the advent of gunpowder, man has endeavored to decorate the stocks of his firearms with precious or semi-precious materials. More than two hundred years ago, Americans adopted the art of stock inlaying in the forms of patch boxes, initial plates, hex signs such as six-pointed stars, crooked hearts and even fish. All were inlaid into the wood of the stock just below the surface.

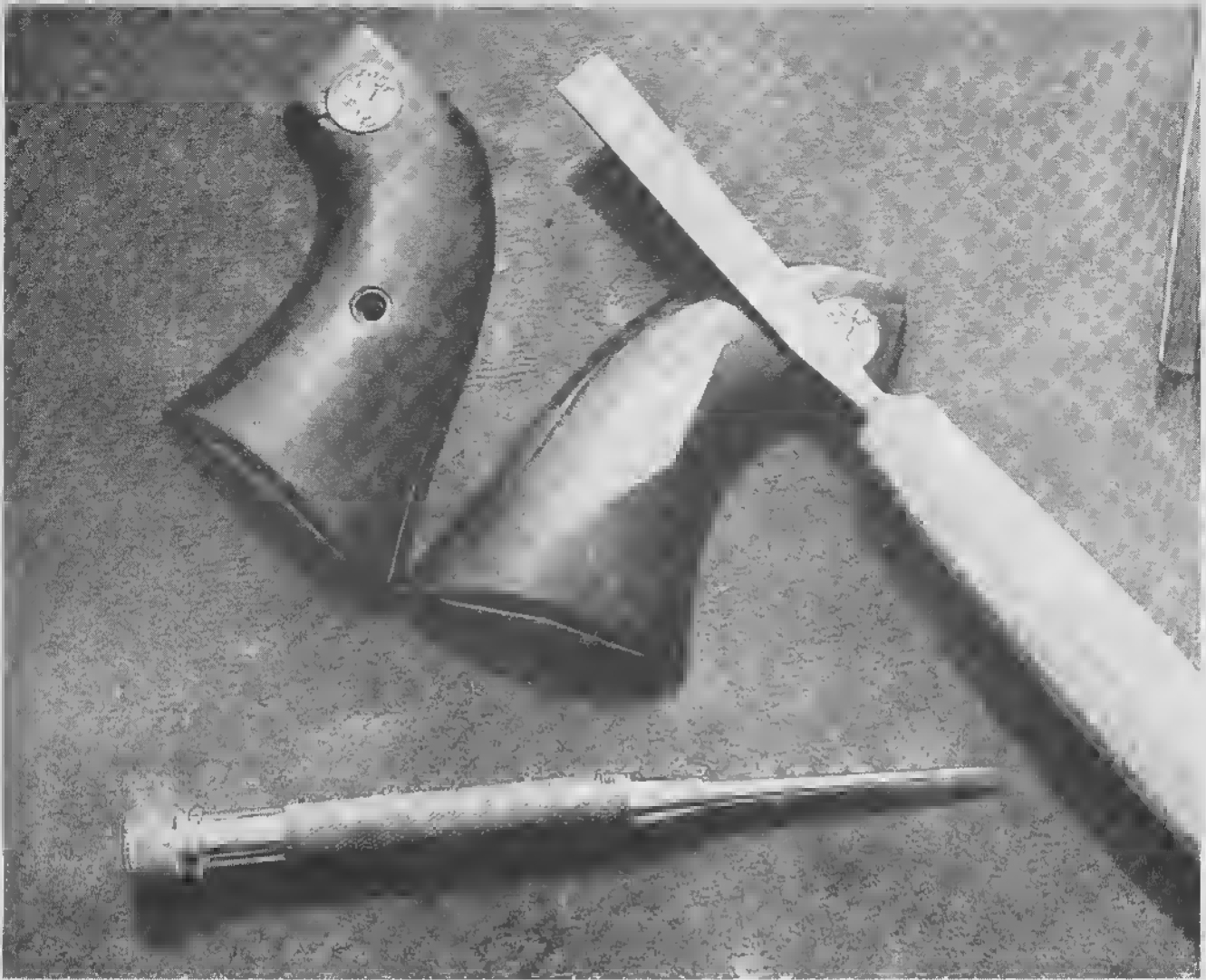
Instead of sitting in front of the glaring eye of the family television for relaxation, I enjoy selecting a few chisels and doing a little inlay work.

Admittedly, inlaying gold or silver initial monograms into a rifle or pistol stock — and doing it perfectly — is no job for the rank amateur. One must undergo several hours of apprenticeship in actual practice to become adept at handling the various chisels necessary. When finished, the

Once it has been inlaid in the wood, the initial plate should extend a little above the surface of the stock's wood, thus allowing for proper stock contouring. The plate usually will have to be bent to follow the wood's contour.







Author's experience has shown that tools needed for simple inlay jobs are minimal: wood chisels, scribe, lead pencil.

inlay has the appearance of being a finished part of the stock or grip wood. No ugly cracks or overcuts are apparent to the naked eye under close examination. The wood and precious metals are wedged into a perfect union, making the stock or pistol grip more attractive, at the same time, adding individuality.

The types of inlays that might be incorporated into a rifle stock or a pair of pistol grips are many and varied, but good taste in design is important. Take, for example, the various forms of initial or monogram plates. These may take the form of a shield, oval plate, a diamond, pointed oval or merely a square piece of silver or gold plate at least .025 in

thickness. The size of these monograms can make the difference between an inlay that is over-done and one that is in good taste.

About five-eighths-inch in overall length by about one-half-inch in width is the accepted size.

Some years ago, I made a set of burl walnut grips for the late Ward Bond of *Wagon Train* television fame. It was his idea to have each of these grips for the Colt Single Action revolver capped with sterling silver and the Colt medallions set into the upper portion of the grips. When finished, these grips had just enough decoration to set them apart. I made a second set for myself despite the fact that

moulding the silver and insetting the walnut perfectly was a sizable chore.

Inlaying a seemingly simple monogram plate into a rifle stock or a set of pistol grips can change the characteristics of that particular gun completely. It sets that gun aside as something special.

William "Wild Bill" Elliott of Western movie fame made himself a set of grips for an outstanding set of Colt Single Actions engraved by the late Cole Agee. These two revolvers had been covered completely in cattle brand engraving as only Agee knew how. This was one set of about four such matching pistols ever done by this famed engraver.

The grips made by Elliott were of a good grade of burl walnut, but were quite plain. He allowed me to inlay a simple initial plate into each of the grips. Of sterling silver, these plates were border-engraved for decoration, then Bill's initials were engraved in the center.

It does require a certain amount of artistic ability, but inlaying can be picked up with surprising quickness by anyone with infinite patience and skill with handtools. However, the complete stranger to this field of gun adornment should spend at least several hours in practice before attempting to work on one of his pet sporting arms. I would suggest an old piece of scrap walnut and sheet brass for this purpose. The brass is used in lieu of more precious gold or

In cutting the mortise for the metal inlay, chisels are held perpendicular to area being mortised out to accept the inlay. Properly accomplished, this should provide a perfect seat for the metal inlay; don't cut too deeply.





Monogram or initial plates may be utilized in various sizes and shapes, ranging from shields to oval designs.

sterling silver. From it may be cut the configuration of the initial plate desired, using a jeweler's fine-toothed saw.

Once the inlay has been cut from the material, whether practice brass, gold or silver, it is smoothed to final contour with Swiss needle files. All edges must be filed to a slight taper downward to permit the inlay to slide into the mortise when cut.

The inlay material is placed on the stock or pistol grip in exactly the position desired for the finished inlay. Using a sharp scribe, outline the complete inlay on the wood, making certain that the scribe is held in a perfectly perpendicular position.

The chisels needed are few, the number depending upon the configuration of the inlay design, but they should be of



Butt of walnut grip is capped with silver. Technique required for shaping the silver prior to inlay in the wood is discussed in the text. It is not a simple process, but can be learned quite fast.

The late Western film star, Bill Elliott, did the inlay work on these grips; ivory ones were made by Bish.



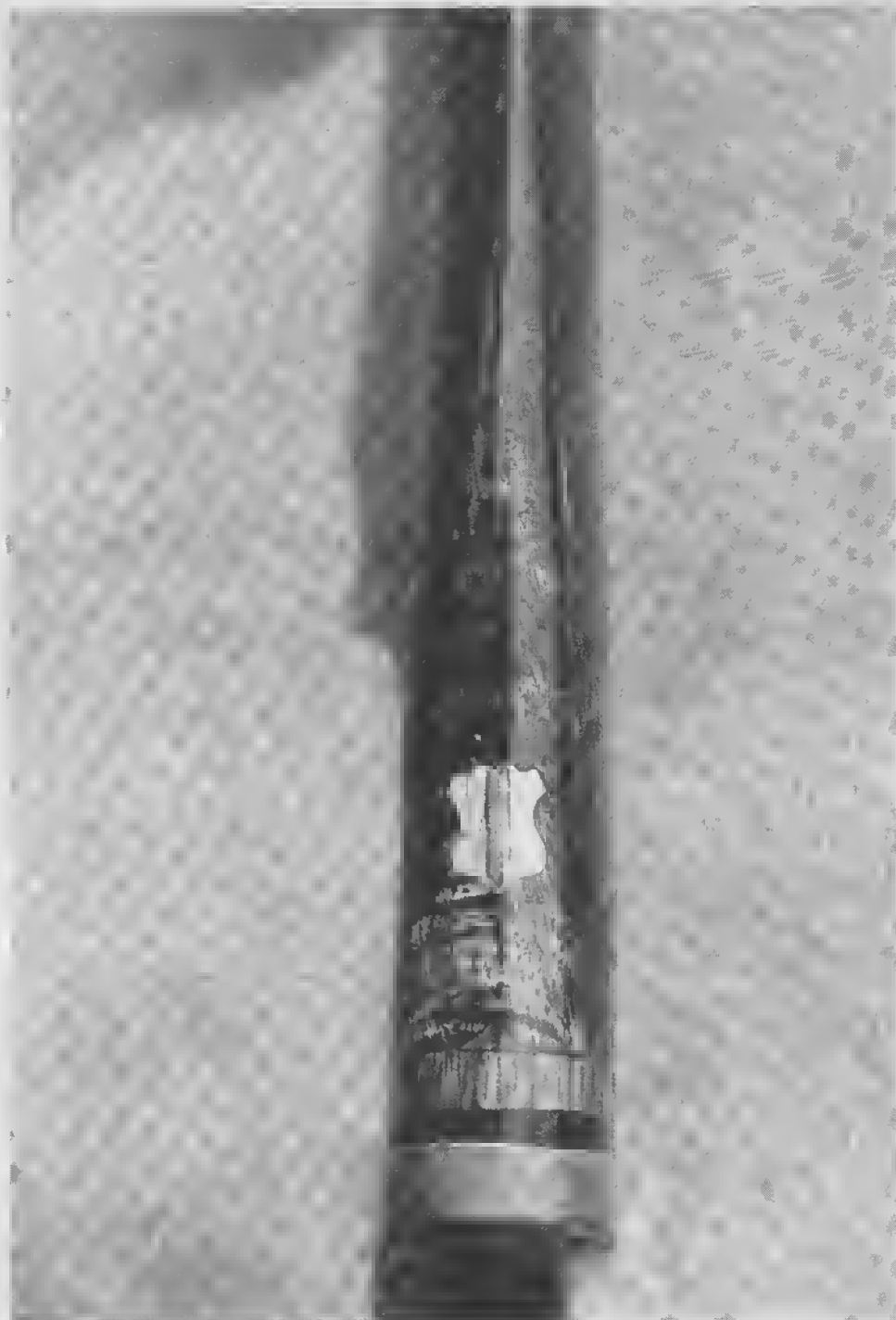


As explained in this chapter, the butts of revolvers can be inlaid with various designs; author chose diamond shapes.

Silver lozenges or diamonds have been laid in the butt of this one-piece grip as well as on the sides for decoration.



Making the required cuts to inlay a shield can prove a challenge to the novice. One should start with simple shape such as an oval on a first try.

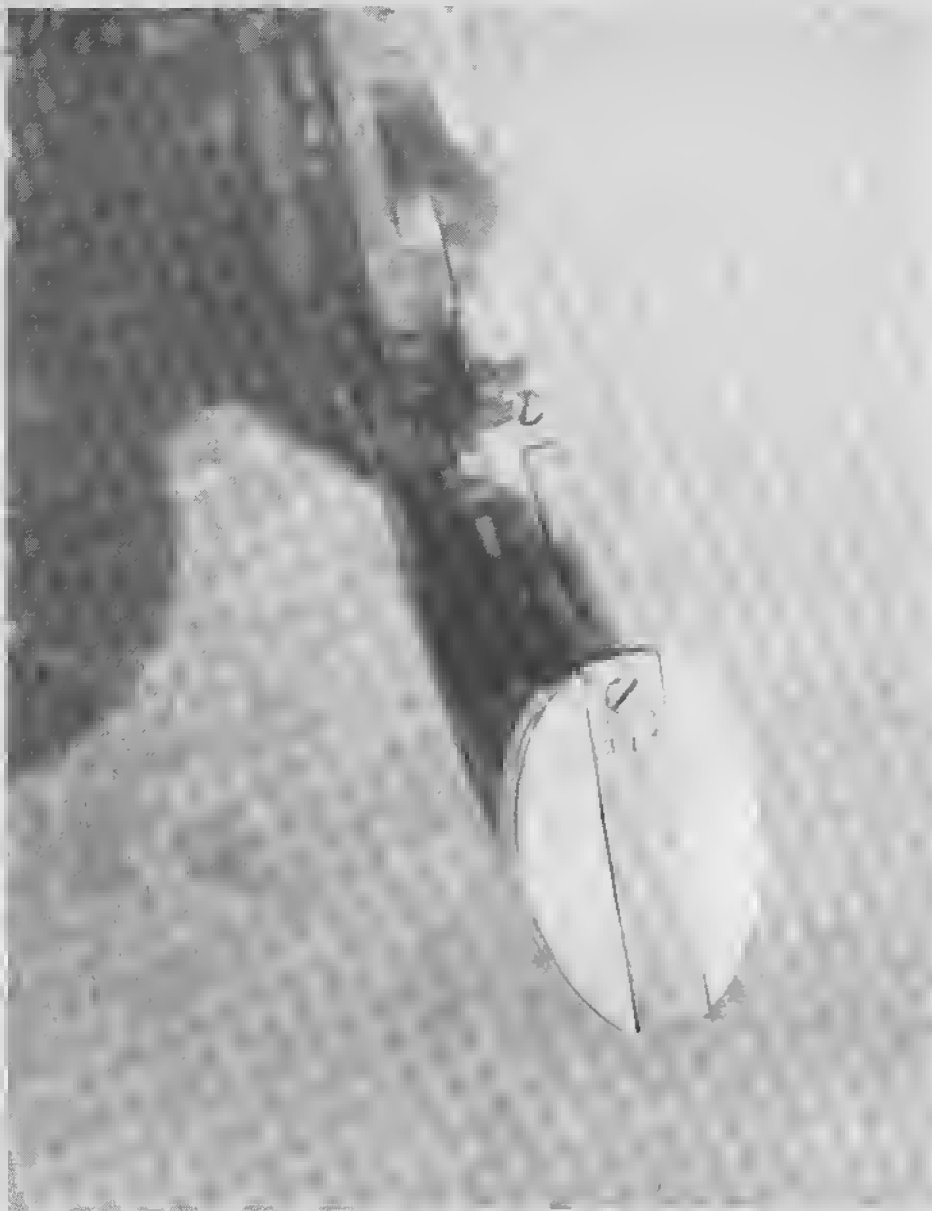


good quality, kept razor-sharp and held in a perpendicular position throughout the entire inletting process. In other words, the mortised section to accept the metal inlay must be cut with great precision to accept the inlay in a snug, slide fit throughout its entire contour. To cut the mortise oversize results in a sloppy-looking job.

With the inlay cut to the design you desire, the edges filed until the inlay is symmetrically perfect and the mortise precisely cut, the only chore left is to install the inlay into the mortise. For this, use a thin coating of epoxy cement to secure the metal in the mortise. When the epoxy

has hardened, it should be dressed to match the contour of the stock or pistol grip.

The usual position for an initial plate on a rifle stock is either on the rounded bottom portion of the stock, half-way between the toe and pistol grip section or about two inches in from the heel of the stock. Regardless of which position you might prefer, both are rounded surfaces, while the metal inlay — at this point — is still a flat piece of metal. To be installed onto a curved surface, it must be bent in length to conform exactly to the stock's contour. This bending is done prior to outlining the inlay position on the stock with



Silver capped grips are most difficult to make, requiring extensive knowledge of metal shaping and soldering as well as technique of final inlaying.

the sharp scribe. Otherwise, the result is a mortise that is too large for the metal inlay.

The inlay is bent to the contour of the stock section, its outline scribed on the stock and the mortise to accept the inlay then is chiseled out.

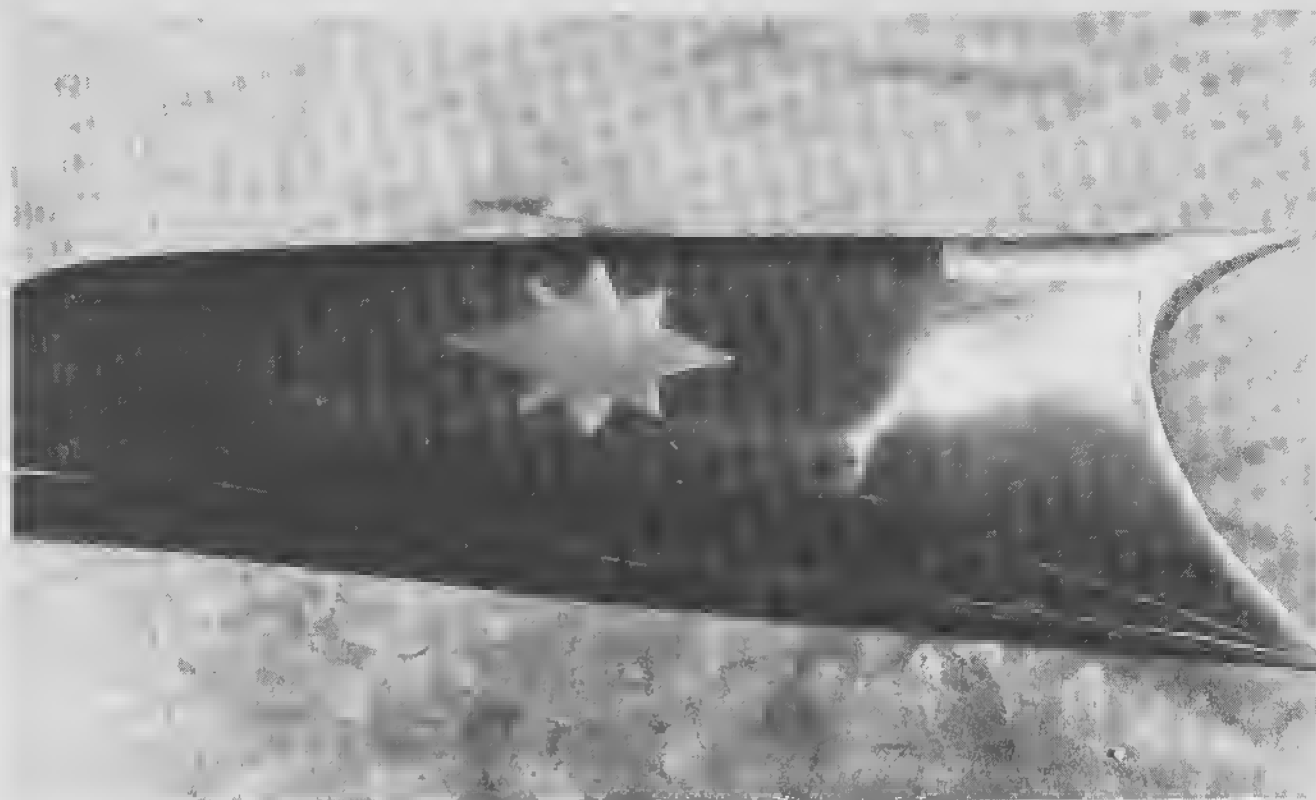
Mix a small portion of epoxy cement thoroughly, then coat the interior surfaces of the mortise with the epoxy. Now take a sharp scribe or awl and scratch the underside of the metal inlay over the entire surface. This will provide a far better surface to which the epoxy cement can adhere. Coat the scratched surface of the inlay with epoxy, press tightly in place in the mortise, then allow it to cure and harden for at least twenty-four hours.

Make absolutely certain that the mortise is cut only deep enough to accept the major thickness of the metal inlay. Make allowances for at least a small portion of the inlay to protrude above the surface of the wood. This will allow for

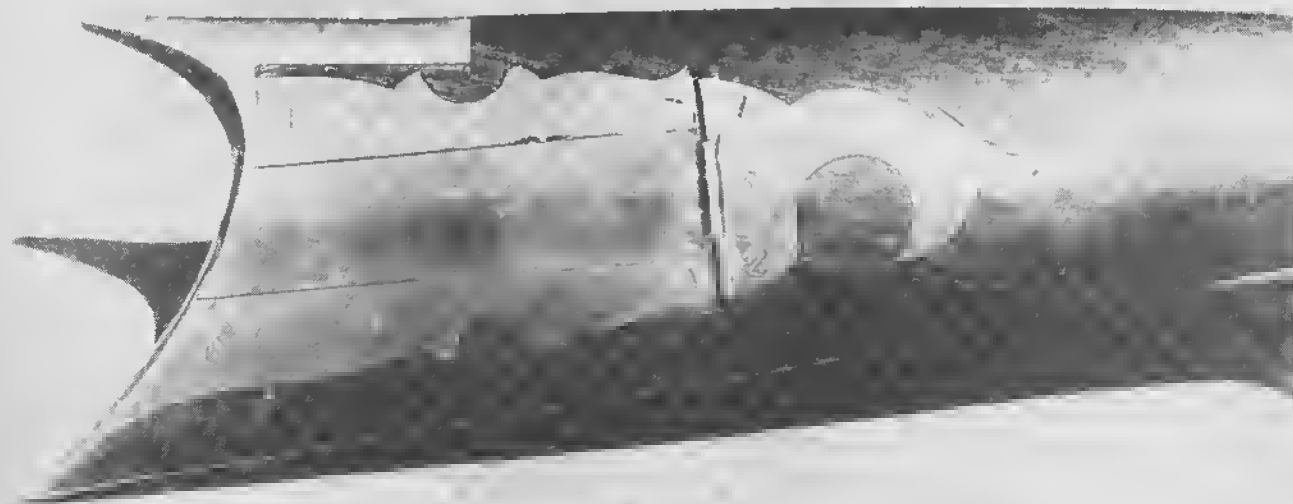
final filing to the exact stock contour after the inlay has been epoxied into the wood and the epoxy completely cured.

After a twenty-four-hour wait for the epoxy to set and harden, use a fine-tooth ten-inch mill bastard file to dress the metal inlay down to the exact surface of the wood. Care must be exercised that the file doesn't slip and cut gashes into the stock wood. Take your time and dress the inlay until it is flush with the wood surface. This accomplished, wrap a piece of 300-grit garnet paper around your file. Smooth up the inlay with this paper, until all file marks disappear from the surface. The final step is to touch the inlay to a loose cloth buffer treated with white buffing compound. This will give the inlay a higher luster.

Installation becomes more of a task with a completely finished stock. More caution must be taken to avoid marring the finish of the stock. When the inlay is completed, it can be engraved with your initials by any engraver.



This unique star-shaped inlay was used extensively on the Kentucky-type rifles of two centuries ago. It is simple for the beginner, as only straight cuts are required in the mortise. (Below) Ornate patchboxes and hex signs were used on Kentucky and Pennsylvania rifles of two hundred years ago. Note precise inletting of this replica's inlays.

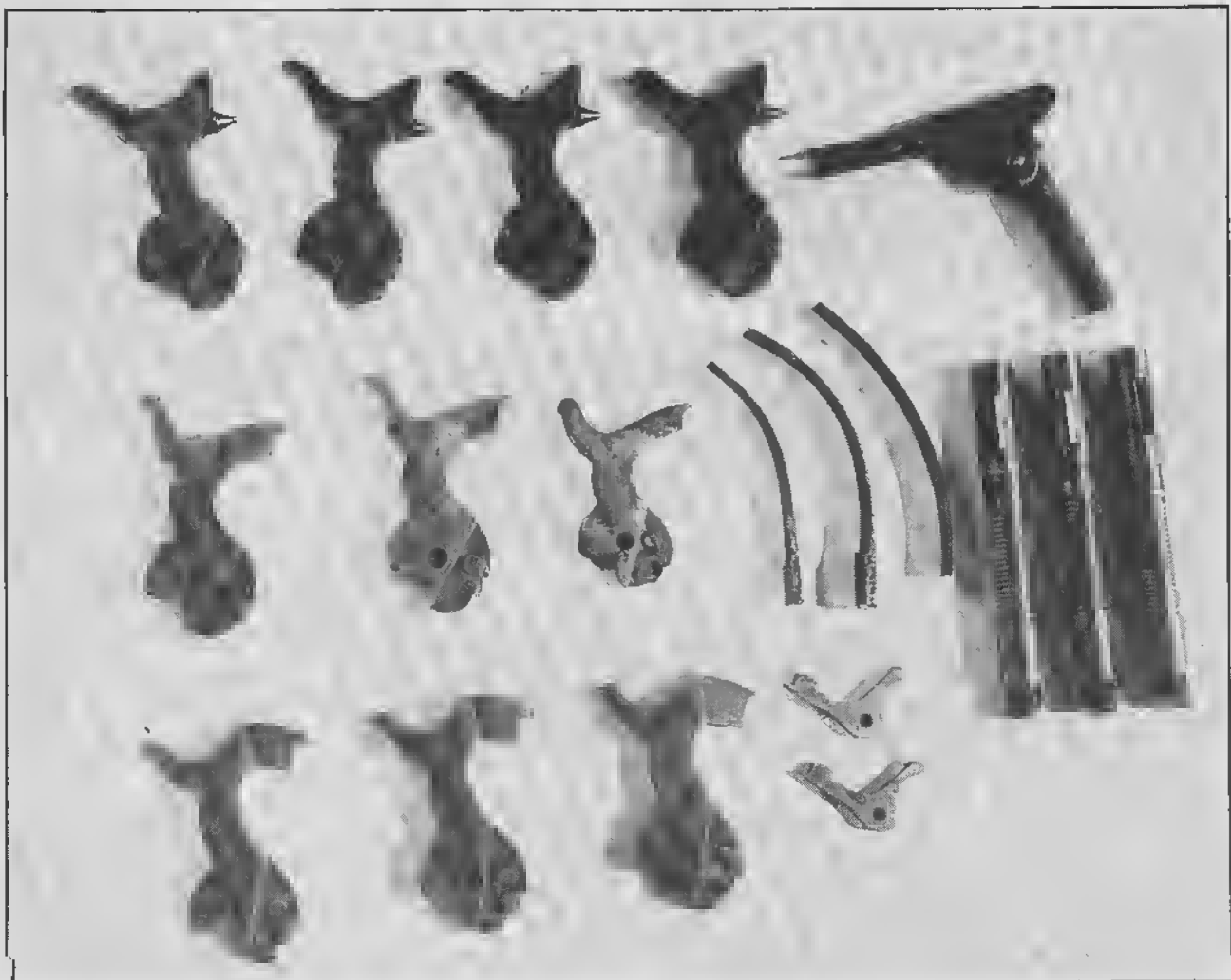


Chapter 16

THERE'S GOLD IN THAT RUST

*While A Firearm May Appear To Be Nothing But
Junk, Its Parts Can Be Worth A Modest Fortune*

Over a century old, these ancient revolver parts have considerable value today. Top row includes Colt single-action hammers, a Colt Pocket Model loading lever. Second row shows Colt percussion hammers, mainsprings and cylinder pins. At bottom are Remington 1858 Army hammers and cylinder locking blocks. All are old but in perfect usable condition.





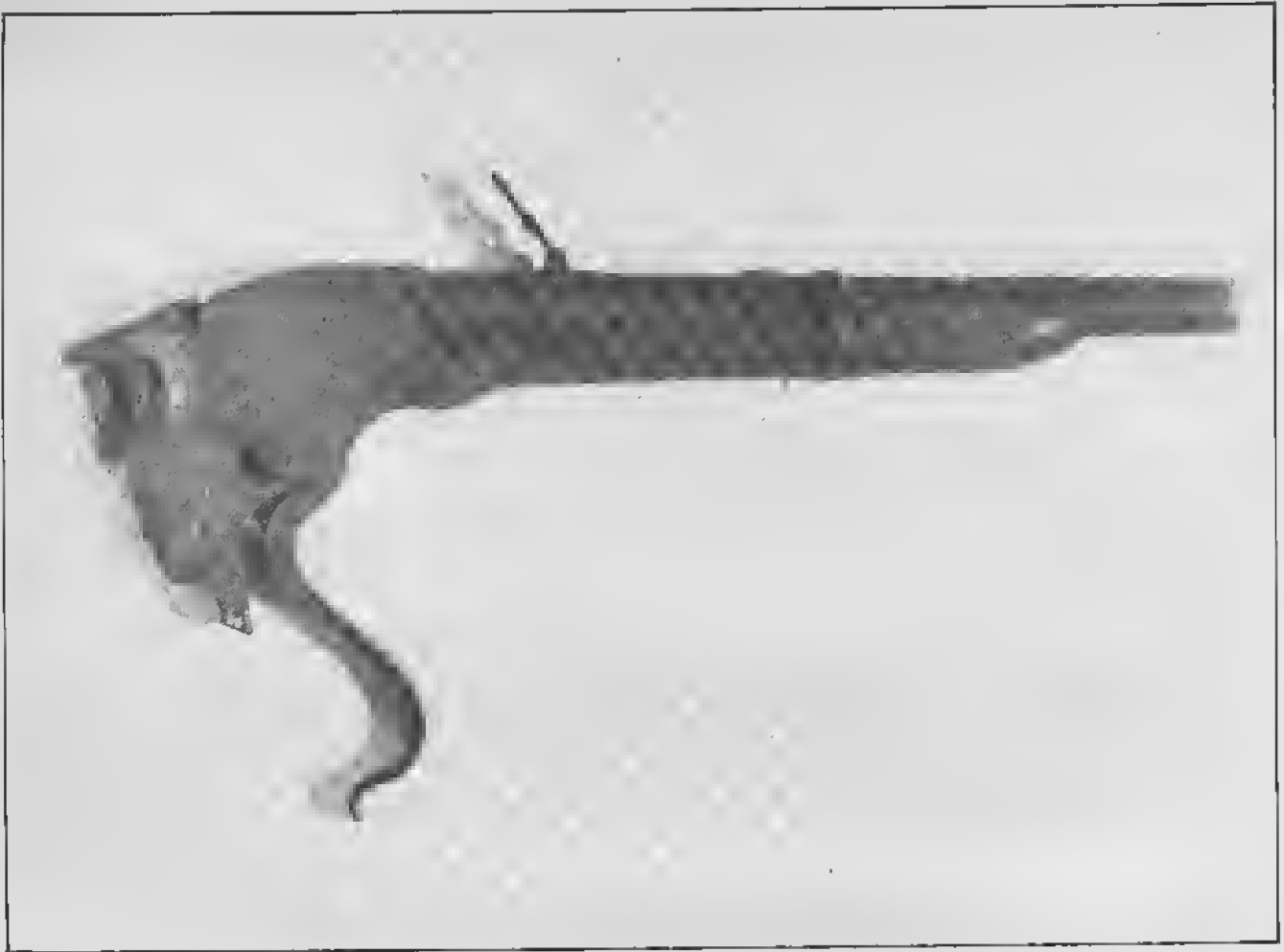
Old Winchester parts are in great demand. Shown are 1873 lever, brass cartridge carriers, hammers, a slide cover, mainsprings, a forend cap, folding rear sight, barrel bands, action toggles and carbine ring. All were salvaged from rifles and carbines that could not be restored properly, under any logical circumstances.

IN CALIFORNIA, there's an old saying that goes, "There's gold in them thar hills." It originated during the Great Gold Rush of 1849. Today, more than 130 years later, this saying is still true, but in a totally different sense.

There's still a lot of gold in those hills, whether it be California or Kalamazoo. However, the gold of which I speak isn't the beautiful yellow color of aurum — or AU, meaning gold. This wealth, instead, tends to be a deep red-dish color and in the form of a crust that tends to accumulate on iron and steel when exposed, or even partially exposed, to the raw elements. I'm talking about old, rusty guns!

Many times I have had someone ask, "What do you want with that old piece of rusty junk?" when I offered some rust-caked rifle or pistol for their examination. Little did they know that the old piece of seemingly rusty junk perhaps had far more value than a solid gold nugget. I personally have found guns for over a period of some forty years that had considerable value. Some were rusted solid, while many others had merely a thin coating of rust film over their entire exterior surfaces.

These guns, for the most part, dated from about 1835 to as late as the early part of this century. All had varying degrees of historical significance and some were worthy of being restored to some semblance of their original condi-



This old Spencer carbine is beyond repair, yet has some valuable parts intact amid the rust. Wooden forend, the folding rear sight, lever and breech block all can be recovered with careful removal and proper cleaning.

tion; some were best left as-is for their relic value. Still others of much later vintage, but today considered obsolete, retained value in what might be salvaged from them in the way of rare gun parts.

Some months ago, I ran across an old 1886 Winchester that had seen a lot of service over the years, then had been hung in the barn to accumulate rust and barnyard dirt. This once fine old rifle was a mess! The stock and forend possibly could be restored to some degree of usability, but most of the screws had been badly chewed up with the use of ill-fitting screwdrivers in past years.

I decided to strip down the entire rifle for the parts that might be salvaged as usable. Many of the screws had to be drilled out, using extreme care to not damage the threads of the receiver into which they were threaded. The first parts to come free were the lever and bolt locks. They were in

perfect condition except for a thin film of rust. Then came the internal parts, all of them in great shape except for years of accumulated dirt and rust. The magazine tube was deeply pitted with advanced rust and badly dented, so it was discarded. The loading gate in the receiver and its screw were saved, as was the forend cap and front barrel band.

Each of these parts was left to soak for several days in kerosene, then was buffed on a fine wire buffer. All turned out to be nice, clean, usable parts showing little or no wear; in fact, the hammer still showed some case-hardening on its surface.

I had bought this rusted old dog for literally peanuts, and the rancher who sold it to me was glad to get rid of what he called, "a rusty piece of junk." I sold all of those parts to one man, who was more than elated to get them. In fact, he

thought I was some kind of nut to let them go so cheaply. He paid me \$200 for the works. The hammer alone he valued at \$50, but later sold it to another collector for around \$100 in cash and trade.

The moral, of course, lies in the fact that there is money to be made from seeking out old guns and reselling them. If they are restorable, this should be accomplished prior to resale for a better price. If not worthy of the time for restoration, it still is logical to dismantle them for the usable parts.

Most of us who have been in the gun field for many years have come to realize some obsolete gun parts are like gold, especially when they are difficult to find in usable condition. Modern-made replacement parts are available for some older model rifles and pistols, but these are usually rough castings. There can never be a substitute for original parts, if a gun is to be considered authentic. Hence, collectors and arms restoration experts are always on the lookout for genuine parts of obsolete firearms, especially those of American manufacture.

Some of the most sought-after gun parts in America

today are those for such guns as pre-war Colt Single Actions; any of the early Winchester rifles or carbines, including the 1866, 1873, 1876, 1886, 1892 models and some early versions of the 1894. Early Marlins, Savages, Remingtons and others of American manufacture all have considerable value for their parts alone.

Probably the most sought-after of early gun parts would be those for the various early Colt revolvers of the percussion era. These include — to name but a few — the 1849 Pocket Model, 1851 Navy, 1860 Army, 1861 Navy and the Walker and three Dragoon models. The early Remington percussion models, such as the 1858 .44 Army revolver, the various new models of the Army and Navy pistols, the Beals models and on into the cartridge models that include the 1875 Army, 1890 Army and all the various derringer-type and single-shots in between all have parts that are in great demand by collectors today.

What has been said is not to mean one should acquire any of the above described guns that are in reasonably good condition, then junk it for parts. No way! Any of these guns in decent condition are worth far more than the mere

This is the Yuba River Winchester discussed in the text. Brass cartridge carrier, unaffected by countless years of submersion in running water, is worth at least \$50. Author is undecided whether to salvage the gun parts.



parts even if they are in what might be termed as usable condition. In speaking of guns that might be dismantled for sale of parts, I am referring only to those that are beyond repair or restoration and have no special historical significance.

I own a number of fine, old rusty guns that probably have a small fortune in rare parts hidden beneath their rusty exteriors. However, I found these guns in the immediate area of the 1849 California Gold Rush claims and would never think of tearing them up for the parts. To me, at least, these guns have real historic character. If they could talk, what stories they might tell.

One gun that I found in the Yuba River of the California gold country is an 1873 Winchester rifle. Deeply pitted, it had no stock or forend, the side plates were missing and all of the internal iron parts were completely rusted away. In closely examining this piece, I found that the brass cartridge carrier and its elevator were in comparatively fine condition. These two parts could be salvaged by making a couple of cuts with a hacksaw across both sides of the rusted iron receiver. Such action, however, would ruin completely a relic that might be worth about \$20 to an interested collector.

A friend recently offered me \$50 for the brass cartridge carrier and elevator, if I would remove them from the surrounding junk. To this day, I haven't made up my mind whether to let him have these parts or just leave this old relic as it is for posterity, a hard decision, indeed.

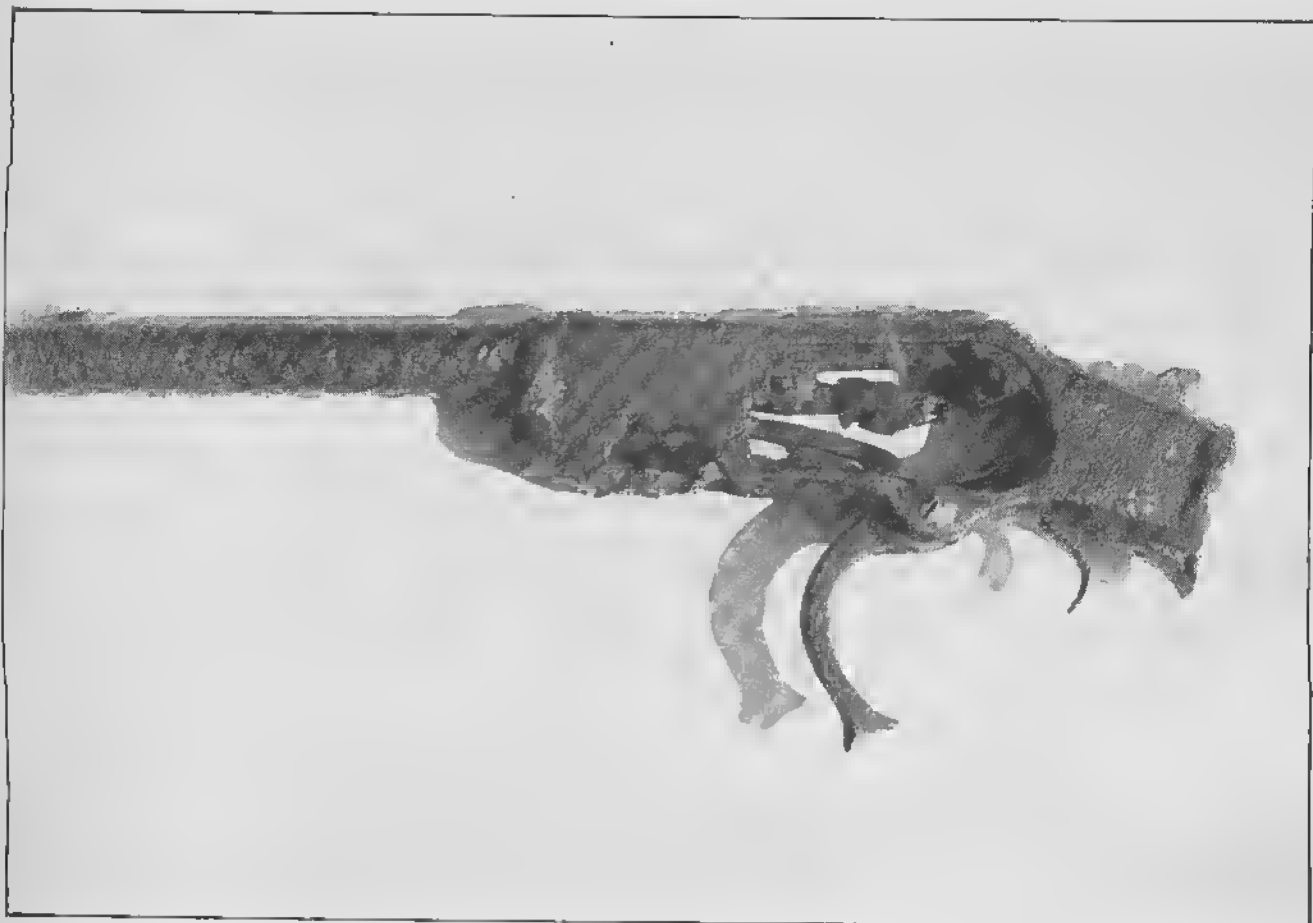
Some thirty years ago, I bought a quantity of old arsenal Colt Single-Action hammers and parts, a quantity of 1858 Remington hammers, as well as parts for both the Remington Navy and Beals models. All of these parts were in unused condition, still showing their bright color case-hardening and blued finish. I got these parts from a man I consider to be the dean of antique gun writers as well as a dear friend, James E. Scrven.

To this day, I still have some of these extremely rare parts on hand. I bought them for what would be considered peanuts today; they have real value now. For the hammers alone, I have received offers of as much as a hundred bucks each. I still refuse to sell them simply because, when these are gone, there won't be any more. I'll just continue to hoard them for my own use in restoration work.

There are several knowledgeable individuals who foresaw the potential value of obsolete gun parts. Turner Kirkland of the Dixie Gun Works became interested in fire-

This Model 1887 Winchester shotgun has had its internal parts removed. It is beyond salvage, but the parts from this relic, in time, will be utilized to restore other guns of the same model that are in need of major repair.





In this view, the deep pitting and erosion of the barrel and receiver are evident on author's Yuba River find. The lever has been broken off, which may be the reason it ended up in the river in California's Mother Lode.

arms at an early age and today is considered the largest dealer in antique gun parts in the country, if not the world. He will be the first to tell you that there is profit in ancient and obsolete guns and their parts.

For the beginning gunsmith, even if on a hobby basis, the search for and acquisition of old rifles and pistols will lead to one thing: he always will have spare parts on hand when he needs them. Say, for instance, that you are working on an old Model 1873 Winchester for which one of the sideplates is missing as well as a couple of screws. It is a good feeling to be able to pull out the spare parts drawer in your workbench and have, instantly at hand, those needed parts.

I know any number of amateur gunsmiths who attend gun shows, not to sell from a table, but to search out usable but obsolete gun parts among the carefully displayed debris covering many a sale table. On occasion, one can hit the jackpot at these affairs. I once bought a complete Henry cleaning rod for two bucks off a table cluttered with

everything from cheap imported novelties to hub caps. The owner had no idea of what he had. It was just another old rifle cleaning rod to him. Actual value for this early model Henry rod was fifty bucks at that time.

Another time I found an Express rifle sight battery on a table filled with mostly non-gun related items (this was supposed to have been a gun show). The price for this sight battery was marked on a sticker tag as \$5. I figured that if the seller was so uninformed as to price an item like an Express rifle sight battery at only five bucks, I would offer him three! He took it and I later sold this sight battery to another custom rifle builder for \$150!

Simply because a gun is old and has a liberal coating of rust on its interior and exterior doesn't mean that it is a junker. There is a good possibility that even the amateur home gun mechanic can restore it to working condition. If not, such a firearm still has a potential of a small gold mine tucked away in its interior in usable and often rare parts.

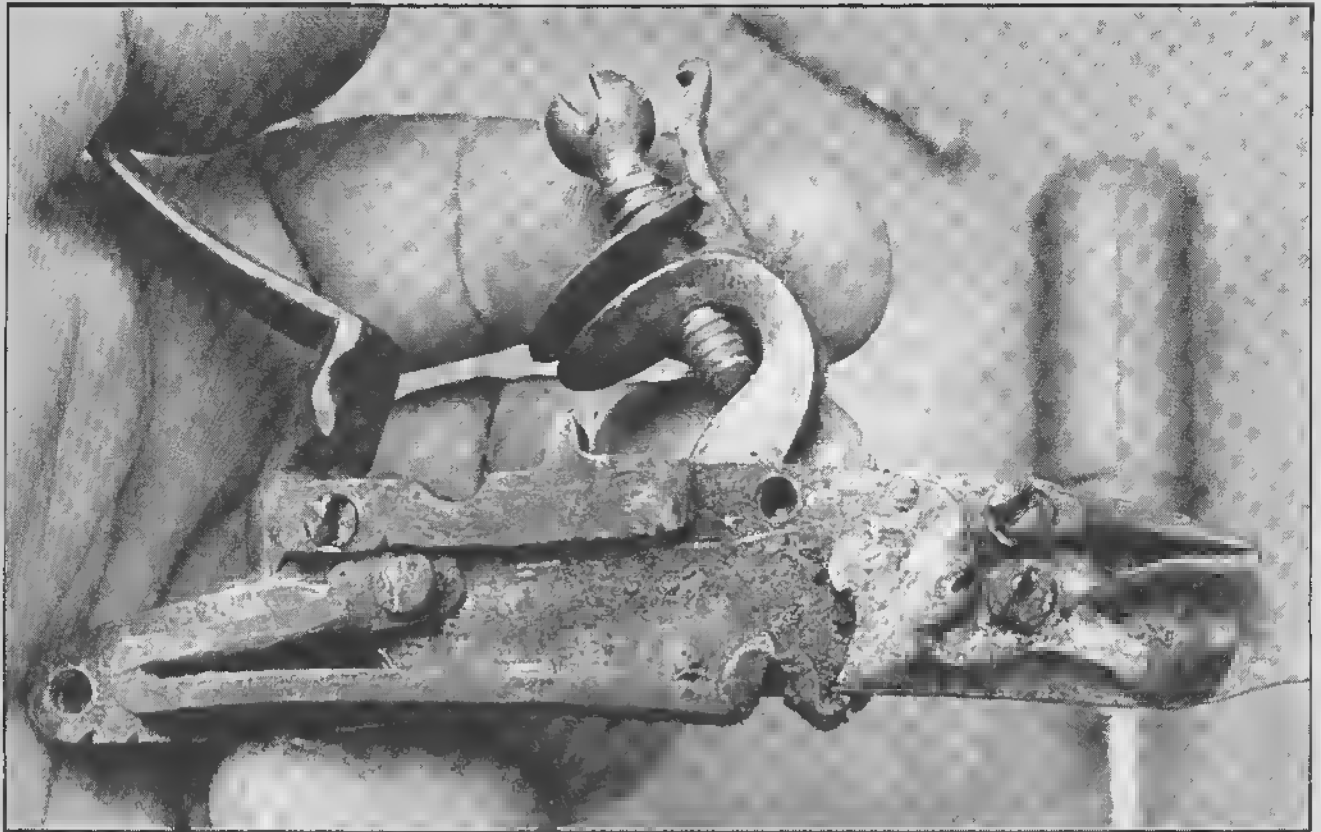
Chapter 17

REVIVE & RESTORE

*Here Are Practical Methods Of
Restoring Junk Guns To Collector Value*

This virutally destroyed relic appears to be beyond help, but in the hands of a good craftsman, much can be done to restore it to some semblance of its original form. The author outlines some of the do's and don'ts of restoring.





The rusted and crusted inner parts of a lock such as 18th Century flintlock can be cleaned and repaired in such a way that the device is in a nearly perfect state.

IN MANY an attic and basement, there reposes one or more aged arms. Contrary to the supposition by many collectors of antique arms that the so-called sleeper is a thing of the past, almost every week some new discovery is made in the way of a highly valued antique rifle, pistol, shotgun or edged weapon.

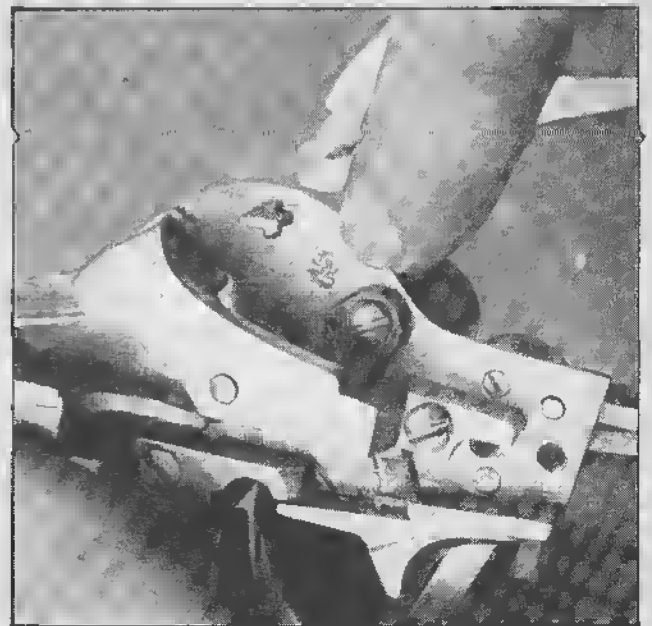
For the most part, arms in the collector class that have lain in the deep shadows of the cellar or attic were stored there many years ago. In some cases, these arms—possibly considered obsolete even at that time—were given no protective coating or grease or other preservatives.

As a result, many of these, when rediscovered by later generations, are in a sad state. Rust has formed like a cancerous growth and, in time, this same rust has caused deep pits in the metal surfaces. Perhaps termites have taken up residence in the wooden stock. In some cases, the metal of the handmade springs may have crystallized and broken. This is especially true of arms that were stored with the hammers or lock mechanisms at full cock.

Many of the old arms, today classed as collector items of

varying worth, have suffered neglect and abuse, some to the point that restoration seemingly would be in vain. However, in the eyes of a person possessing imagination and the ability for careful workmanship, no antique gun should be lost to future generations simply because it has deteriorated to the point of near worthlessness. While their usefulness as active firearms may have passed, their attractive lines and historical significance remain.

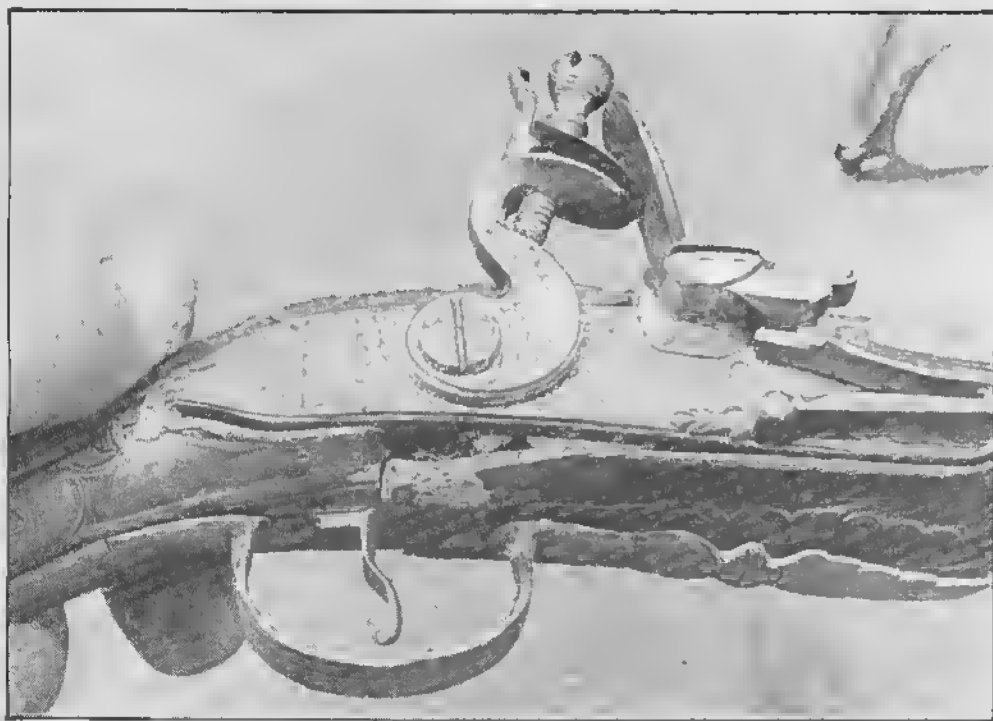
Restoration of antique arms involves varying degrees of craftsmanship in woodworking, metallurgy, plus knowl-



Proof or maker's marks can be found on lock mechanism or barrel. These are most important for proper identification of the arm and in evaluating it for sale to a collector.



Chipped wood sections often can be replaced with repairs that are undetectable. This adds value and desirability.



The mainspring slipping off the sear caused the entire stock of this antique pistol to split, then crack. Result was a major repair job that is described in chapter text.

edge of how to work such materials as gold, silver, brass, copper, wrought iron, ivory, bone, semi-precious stones, horn and the other materials used in aged arms, foreign and domestic.

But the most important phase of arms restoration is the ability to keep the repairs from looking new. To make replacement parts that are too shiny or too well finished could conflict with the original gunsmithing done in a pioneer environment. Should a part from a crudely built lock mechanism be broken, it can be replaced with a new, handmade part, provided this new part has the same crude appearance as the original components of the original lock.

The art of matching craftsmanship with some of the old

master armasmakers can prove a challenge to even the most experienced in the field of gun restoration. The real secret is to think as the old craftsman did. Consider the tools they had and the methods they utilized in making a complete lock mechanism, including the springs, bridles, frizzens on down to the finest and smallest screws and spring stirrups.

One of the most perplexing problems encountered by the modern arms restorer is in matching the varying age colors of the metal for the new parts and the age patina of the wood. All of this is necessary when parts have to be made to replace broken ones or wood has to be repaired or replaced.

Over the years, I have done antique arms restoration for

many collectors and museums and have become aware that each restoration job creates a different problem. Anyone undertaking to restore old arms, whether guns, edged weapons or other forms of armour, soon becomes aware that a multitude of chemicals and even household staples are needed for the correct restoration of any arm. Common salt, vinegar, citrus juices, as well as various items from the medicine cabinet, all can play an important part in the correct coloration of both metal and wood. Each arm will present a new problem along these lines and many hours of experimentation can be expended before the proper combination is achieved to produce the color that matches the rest of the arm.

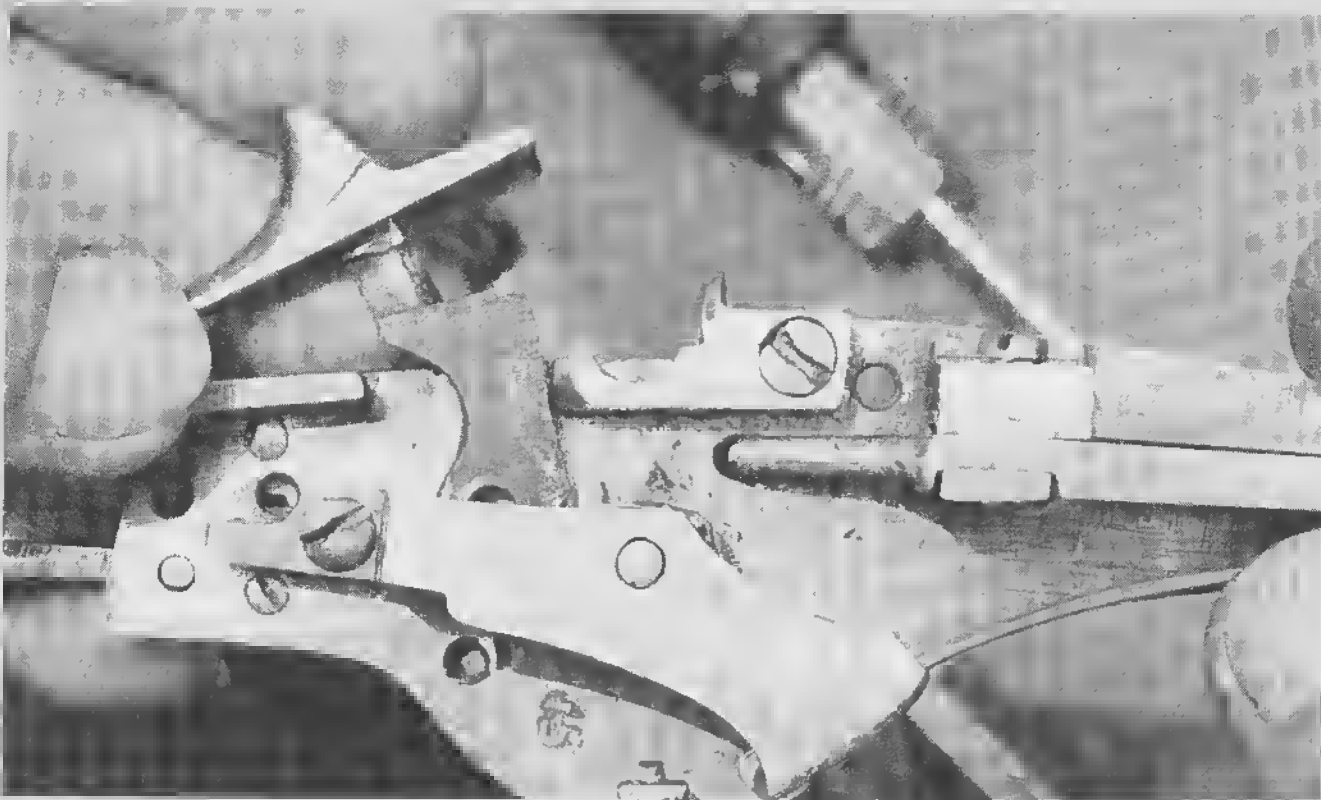
Aside from the correct coloration of any necessary new parts — which can prove to be one of the most trying of all chores in this field — there arises the problem of just how far one should go. A rifle brought to me for restoration was a version of the Remington Creedmore target rifle. In per-

fect condition, its value on the current collector market runs into a most respectable figure. However, this particular rifle had been through a fire in which the stock had been burned beyond repair. Luckily, neither the barrel or action had been damaged beyond the original bright, blued finish being dulled.

Thorough examination showed that the classic-style stock, from the rear tang back, had been turned to charcoal by the blaze. Forward of the rear tang, the lock section and forend were in amazingly good condition. Following consultation with the owner, I removed the charred portion of the stock in the area of the rear tang, which also incorporated the fully checkered pistol grip section. This was accomplished by cutting away the badly burned section of the stock, making a perfect V cut in the area of the pistol grip. Several months were spent in searching for a suitable piece of walnut to match the existing wood. Once located, the new walnut was shaped to the exact dimensions of the

The novice must recognize his limitations. Restoration of an old 1873 Winchester can create problems for an amateur. Replacement parts are difficult to find and are expensive. This may require that some parts be made by hand.





*Above: The missing pan of this wheellock pistol had to be duplicated by the author using appropriate type of iron.
 (Below) When completed, the new pan cover was installed on 17th Century wheellock in exact fit; it worked perfectly.*





The Colt 1851 Navy Model with squareback trigger guard is a rare firearm. When discovered, this one was in need of numerous small repairs to return it to normal shape. Original age patina was retained, holster also restored.

old stock, cut to fit the V in the pistol grip section, then it was doweled and epoxied in place.

After a forty-eight-hour curing period for the epoxy, the spliced area in the pistol grip section was filed and sanded to the exact conformation of the original. The checkering, much of which had been cut away to eliminate the charred wood, was recut, following the original pattern. The recut checkering completely covered and camouflaged the V joint of the new butt section. All that was necessary was to color the new wood to match that of the original forend.

For two solid weeks, I experimented with a variety of stains and chemicals — as well as combinations of both — before an exacting match was obtained for the Remington Creedmoore. Stains or coloratives for both wood or metal must be applied then allowed to set and dry for at least twenty-four hours before their true tones can be evaluated. This is especially true of woods. Stain, as a rule, will be much darker in color, when freshly applied, than when dried completely. However, on numerous occasions I have found this theory to work exactly backward with some stains and chemicals. It will go on dark and dry darker! Experimentation is the only solution.

With the Creedmoore, once the correct stain tones had been achieved on the wood, the entire stock was buffed on a muslin wheel, until a well worn patina look was achieved. It then was necessary to distress the new portion of the stock to match that of the original wood. Once finished, the new stock section was undetectable to even the most practiced eye. A fine old rifle had been returned to its place in the collecting world instead of being relegated to some scrap heap.

Naturally, there are purists who frown upon any arm that has undergone restoration treatment. In the majority of collections, even the finest, there may be found arms that have, at one time or another, been restored. If done properly, this shouldn't detract from their value. There are many Colt Walkers, Patersons, Henry rifles, Sharps and other collector items, passed from one collection to another, that all have seen some rather extensive restoration.

Another facet of restoration concerns the markings that may be found on many old guns and arms of all types. How many times have most of us found fine old guns with the names completely removed by undue buffing or sanding?

The term, restoration, does not mean mutilation! The correct restoration of anything means simply to put that object back in operative condition, as near to the original as possible, without gobbing it up with plastic woods and buffing it to death! Any markings, regardless of how dim they may appear on any arm, should be left as is. If there is rust pitting surrounding these markings, leave it alone! To attempt to remove it usually will cause the markings to disappear, along with the pits!

Of the multitudes of experts, I estimate that nine of every ten never have restored an antique arm in their lives. Yet, they are prone to dictate the methods to be used by craftsmen who have done this type of work for years! There are only seven or eight qualified men in the entire United States that can be classed as bona fide, qualified craftsmen, who thoroughly understand the full meaning of arms restoration and how it is accomplished correctly.

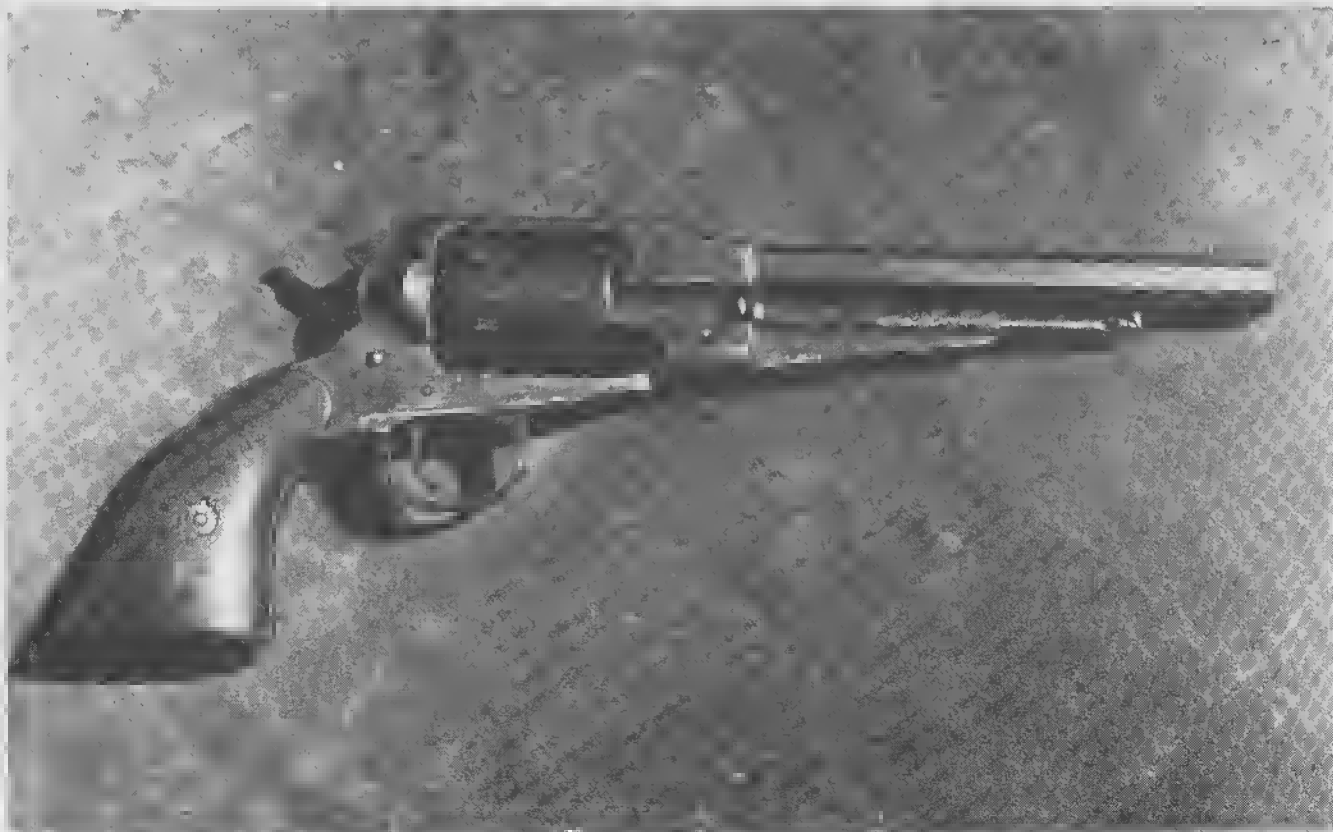
There are no set rules for restoring any arm — antique or

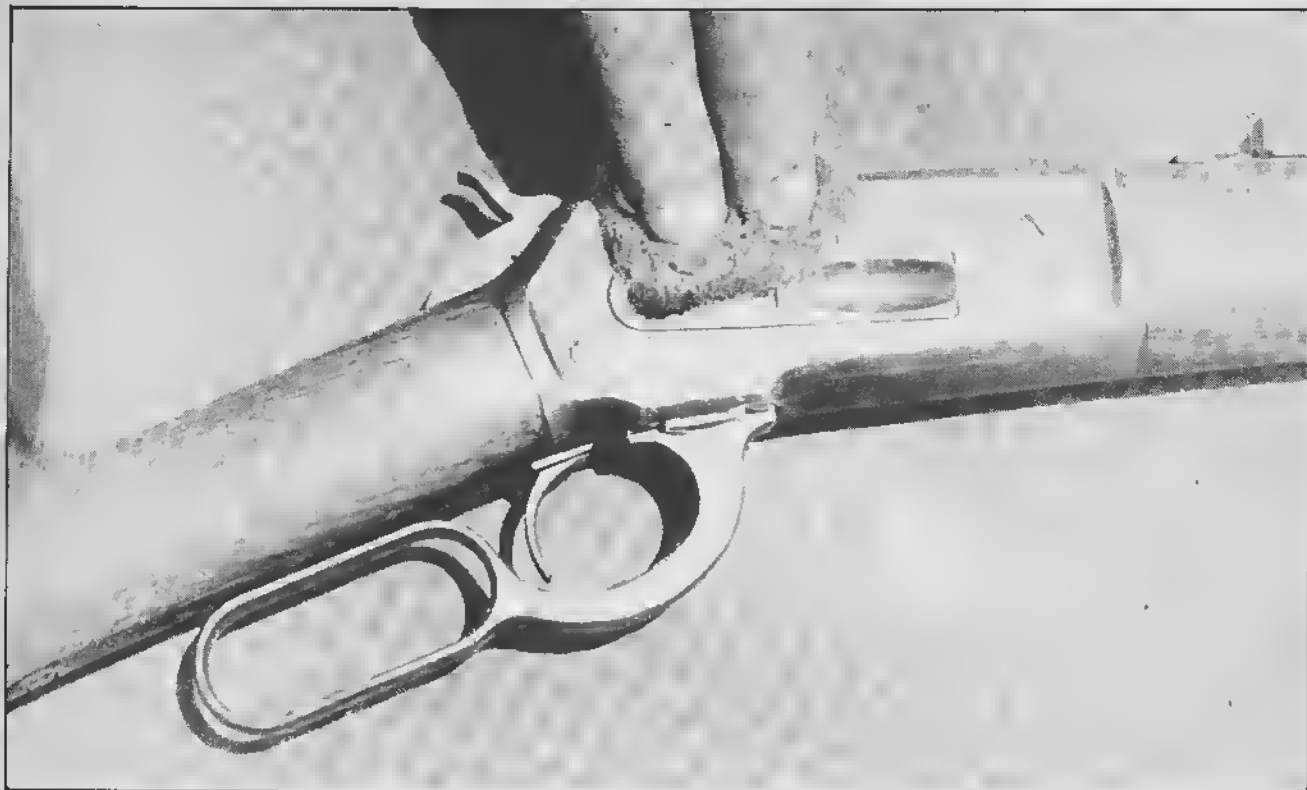
modern. Each will present a new set of circumstances with regard to the extent of the necessary repairs to both wood and metal. If done properly, such restoration should not detract from either the desirability or value of a rare arm.

Over the years, I have received many letters from would-be collectors requesting information as to how they might go about restoring an old shotgun. Almost invariably, these old relics weren't worth restoring. Unlike aged rifles, pistols and even edged weapons, the average shotgun hasn't increased greatly in value. An old, obsolete shotgun is just often that: an old, obsolete shotgun.

Unless it is a double-barrel flintlock fowling piece or possibly of the drilling type with an attached rifle barrel, value is just about at the bottom. But should that old shotgun be a Colt, Parker, L.C. Smith, W.W. Greener, Purdey, Holland & Holland or the like, the picture changes. There are collectors who will pay premium prices for

This 1858 Remington .44 Army percussion revolver was found covered with a film of rust after lying for decades on the dry Arizona desert. It was restored to shooting condition with careful workmanship, replacing some parts and grips.





choice specimens. Shotguns in this classification often are well worth restoring, provided such work isn't too expensive.

As outlined earlier, restoration can involve countless hours of experimentation merely to attain the correct stain for a piece of wood or a bit of ivory. More hours may be spent in fashioning some intricate piece of the lock mechanism to match exactly the original in looks and durability.

Consequently, the restoration of any fine and highly valued arm, whether a fine pistol or suit of knight's armour, can be costly. Take, for example, a rare Texas Dance revolver I restored some years ago. When brought to me, all of its internal parts were completely shot! The rarity had been a toy for the children of a Texas family, until purchased for a small amount by my client. In fact, when discovered, this rare revolver was being used as a hammer to drive nails into a soap box racer!

Restoration required that all internal parts be repaired extensively or replaced. The backstrap and trigger guard were repaired and even new nipples of the exact size and shape of the original Dance version were handmade and installed in the somewhat battered cylinder.

The exterior of the piece showed a nice age-brown patina, so it was left alone other than for straightening and compulsory repairs.

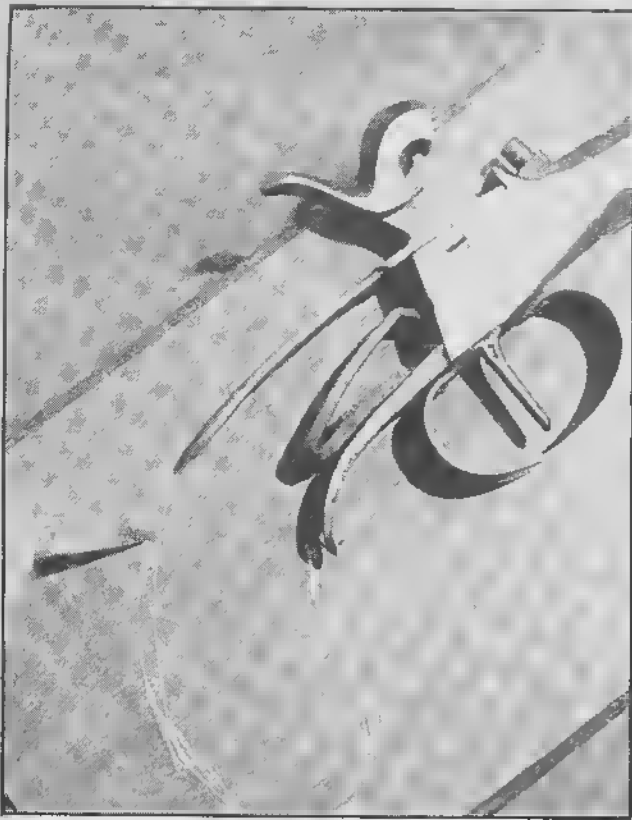
When completed some weeks later, the bill on this restoration ran into several hundred dollars. My client later sold the revolver to a mutual friend (who was fully aware of the extent of the restoration) for \$1200. Despite the costs of restoration, the client realized a neat profit on the rare Texas revolver, impossible had this rarity been left in its sad state of disrepair and abuse. Today, the gun is worth several times the price for which my client sold it.

Unethical? Not at all! Arms as rare and desirable as a

Fine 0000 steel wool, lubricated with light machine oil, is ideal for removal of light film rust, solidified dirt and grease from fine arms. Should any original bluing remain under rust film, this method should restore it.

This fine, old single-action Colt required only thorough cleaning and replacement of two screws to put it in shape.





Wooden grip for this mid-19th Century percussion single-shot pistol had deteriorated to dust. A new grip can be fashioned from walnut in method shown. (Right) Author studied old photos of such a pistol in order to copy the specifications for the new grip, make it authentic.



Texas Dance, a Colt Walker, a Paterson or any other arms of similar rarity certainly are worthy of extensive restoration, but only if that work is done correctly and without thought of falsification.

It is well known in collecting circles that one of the finest and most valuable collections of revolvers in the United States includes many that have undergone extensive repairs, restoration and even new blue jobs. However, in the eyes of many knowledgeable collectors, this doesn't detract from the desirability or the value of rare pieces. The quality of the restoration work should be as if done by the original maker a hundred years or so ago.

In any profession, there will be charlatans, fakers and con men. The charlatan may convince you that he is one of the best arms restorers in the business, but when you get your valued antique back, it's good for little more than a paperweight! The faker enters the gun restoration business, because it can pay well. However, he finds that he

can really clean up by turning out fake Colt Walkers, square-back Navys and pocket pistols. Later, he may graduate to more valued arms.

The con man is the exception rather than the rule, but still present in gun and arms collecting circles. He's the guy who will purchase a rather plain version of a desirable Winchester, Colt, Remington or some other in-demand breed of gun. Some months later, he will show up at a gun show with an especially fine engraved version of this same gun, which he offers for sale at a fancy price.

Honest arms restoration is one thing, but when this craft is used for bilking, it becomes a racket!

There are many pros and cons regarding correct and ethical restoration of any authentic, valuable antique: the field of antique firearms is one of the most critical from a standpoint of what can be done and what can't.

There is the old bugaboo about a wire buffer being used on antique arms. There is a variety of types of wire buffers

available to the novice. Some will ruin a fine, old gun or other armour quickly and efficiently. However, there are fine-bristled wire buffers that will remove only the rust and caked crud without harming the finest blued finish!

If an arm is gold- or silver-plated, no buffer can be used without the plating being removed quickly. But wire buffers in the proper texture are a must for the astute gun restorer, when rusted or dirty guns are handled.

Proper restoration of a collector-type arm concerns only that work essential to the overall appearance and mechanical functioning of the arm. It does not mean that because the wood is a bit gouged and rough it must be replaced.

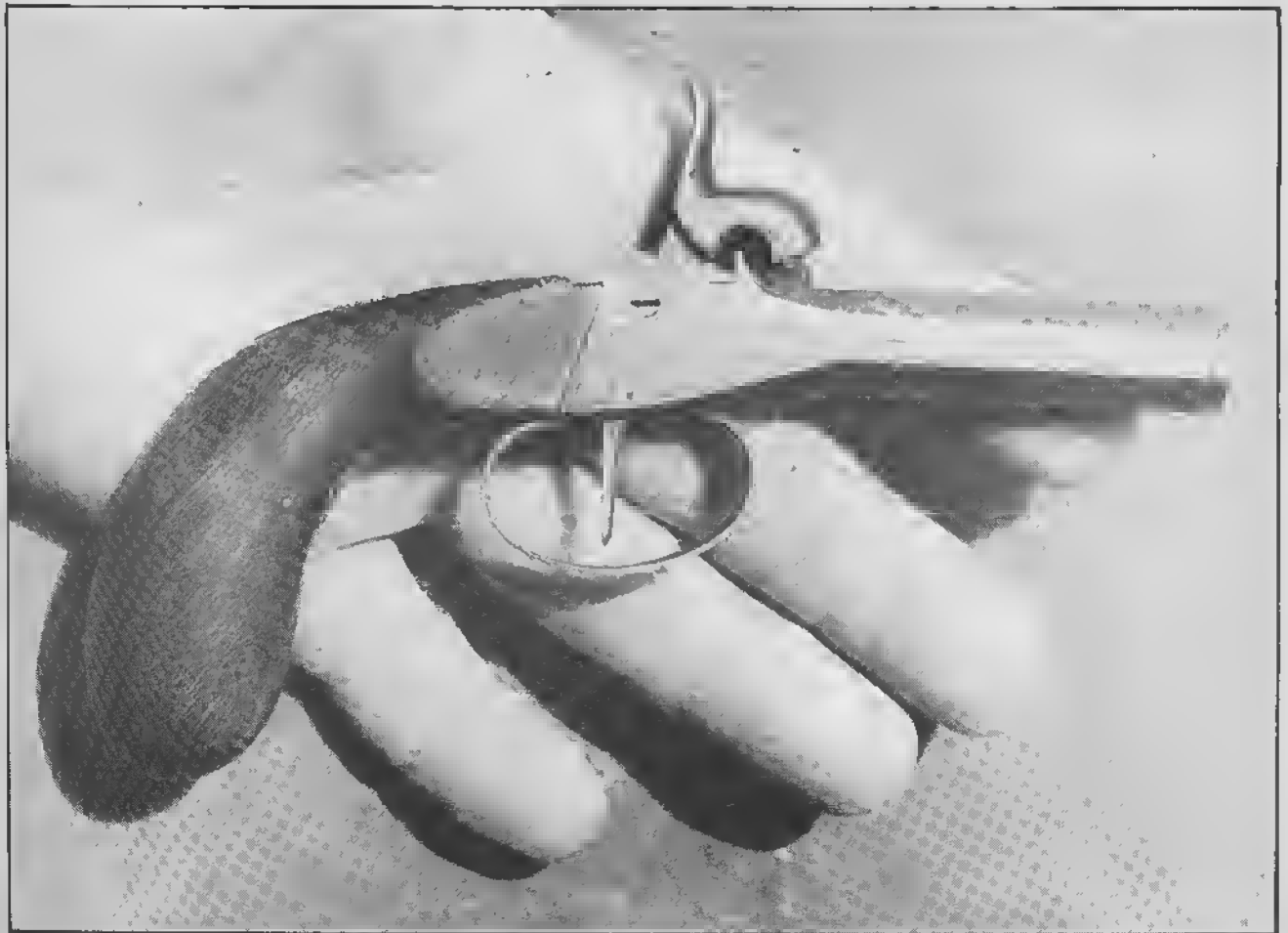
Basically, in correct restoration of any arm, literally nothing is taken away from the arm that is original. All original parts should be retained and repaired as necessary with the exception of broken springs, which are unrepair-

able as a rule. Missing parts may be made and installed to put the antique in good repair. However, when such replacements are made, they should be noted in letter form and passed on to the owner or future owner of the arm to assure no misrepresentation.

Arms restoration most certainly is not confined to ancient arms and armour. Highly prized in gun collecting today are such semi-modern guns as the 1886 Winchester, the 1892 and some early and deluxe version of the 1894 Winchester; certain Colt pistols and revolvers made after the turn of the century have come into their own as highly prized collector items. There are the various deluxe sporting arms as well as comparatively rare or unusual military arms produced in certain European countries from 1880 through the period of the Second World War.

For the most part, arms in this category include those

The finished walnut grip should be colored to a proper shade, distressed slightly to match gun's overall condition.



This beautiful aged Colt Single Action retains all of its age patina. Original grips have been left intact, showing wear of years, but metal was cleaned carefully.



line but now obsolete sporting rifles by such makers as Rigby, Purdey, Holland & Holland, Greener and Alexander. Along with these English-built arms are those produced in Germany up to the period immediately preceding World War II. Among these German-built arms of this later period is the so-called drilling or combination rifle/shotgun. All are worth restoring, but can create special problems for the astute arms restorer.

While some parts are available for some of these semi-modern collector's items, such items as forends and even lock parts can prove a major problem to the technician attempting such restoration. In many instances, it becomes necessary to adapt and refit parts from other guns to serve the purpose on these later but obsolete models.

One problem facing the arms restorer is attempting to repair the repairs made by some novice. Many potentially fine arms, that could bear up well under even extensive restoration, have been ruined beyond repair or restoration by the inexperienced or inept attempting to do the work themselves. I have examined choice pieces that had been butchered with files and hacksaws to the point that they no longer made even good decorators. Had an experienced man worked over these guns, value would have been almost fully retained, as well as historical significance. If know-how and experience are lacking, it is best to get the opinion of an expert in the field to evaluate the necessary repairs and the potential value of the arm after restoration.

At gun shows around the country, one can see a multitude of otherwise fine collector arms that have been ruined under the hammer and chisel of the inexperienced. Not only do these once choice items include such rarities as wheellocks and snaphaunces, but semi-modern sporting

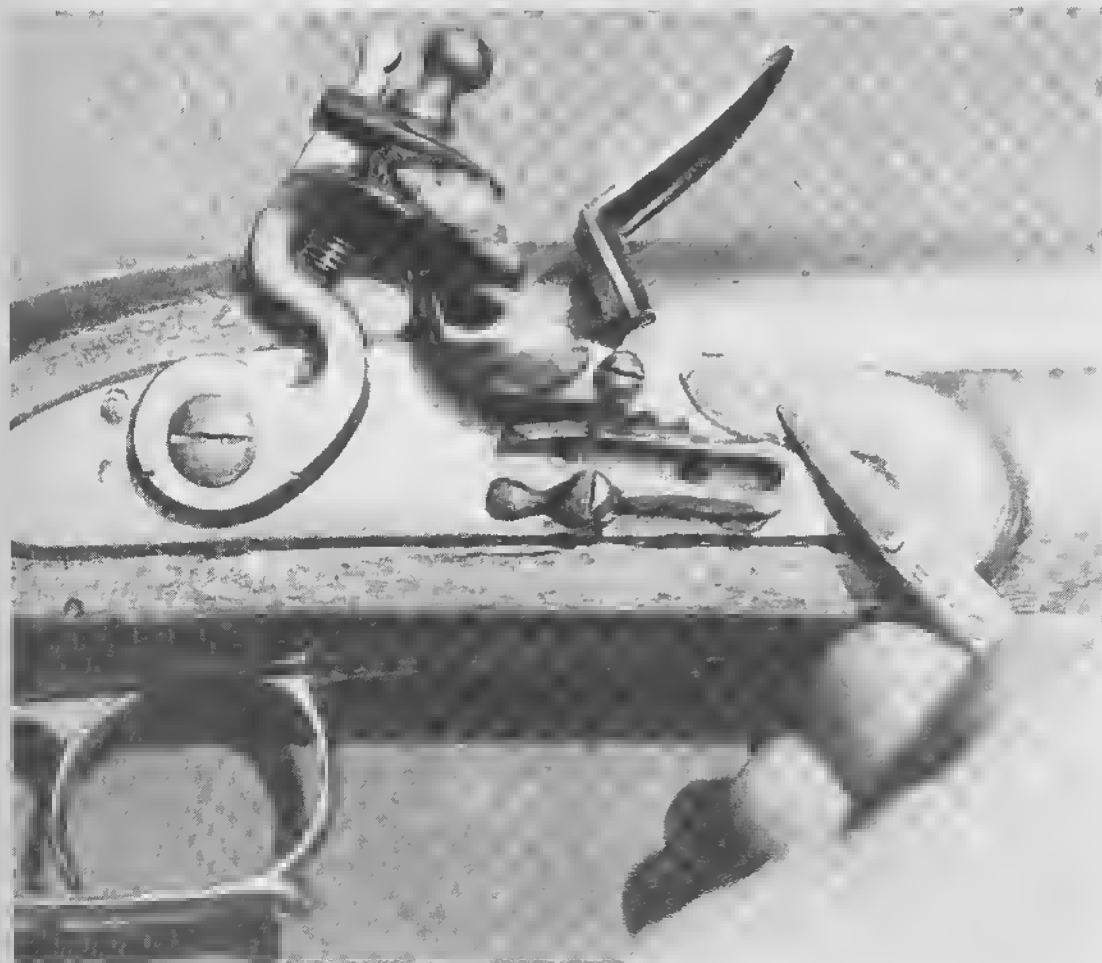
and military rifles and pistols. Even edged weapons have undergone various phases of unlearned butchery at the hands of the would-be arms restorer.

The science of arms restoration requires years of actual experience in the general field of gunsmithing, then more years of research of the various ignition systems and the component parts that go into each system. Hours of research often are necessary before even the most learned arms restorer can proceed with a specific job. Should one be restoring a suit of knight's armour from the Middle Ages (500 A.D. to 1450 A.D.), the craftsman wants to be absolutely certain that such repair materials and his workmanship match that of the correct period.

This is especially true if such work is being done on a fine piece of equipment for a reputable museum or an advanced collector. To goof on such a project would be unforgivable.



Brownell's offers a wide variety of concentrated dyes to mix to obtain an exact match with the wood. (Below) The burned wood around the locks of percussion and flintlock firearms may be replaced by inlitting wood of a correct type in an exacting fit. When done correctly, the work should prove to be virtually invisible even to experts.



CROWNING GLORY

Improper Muzzle Crowning Can Destroy Accuracy; Here's What To Do About It!

SOME YEARS ago, a competition shooter showed me what I initially thought to be one of the finest target rifles I've ever seen. He had just returned from the range where he had found that this seemingly perfect rifle was throwing its shots all over the target. This was despite the fact that it had a new barrel of super target grade that was meticulously bedded.

He explained his troubles in detail, elaborating on the fact that he had spared no expense in having it built for competition shooting, only to find that it wouldn't hit the side of the proverbial barn!

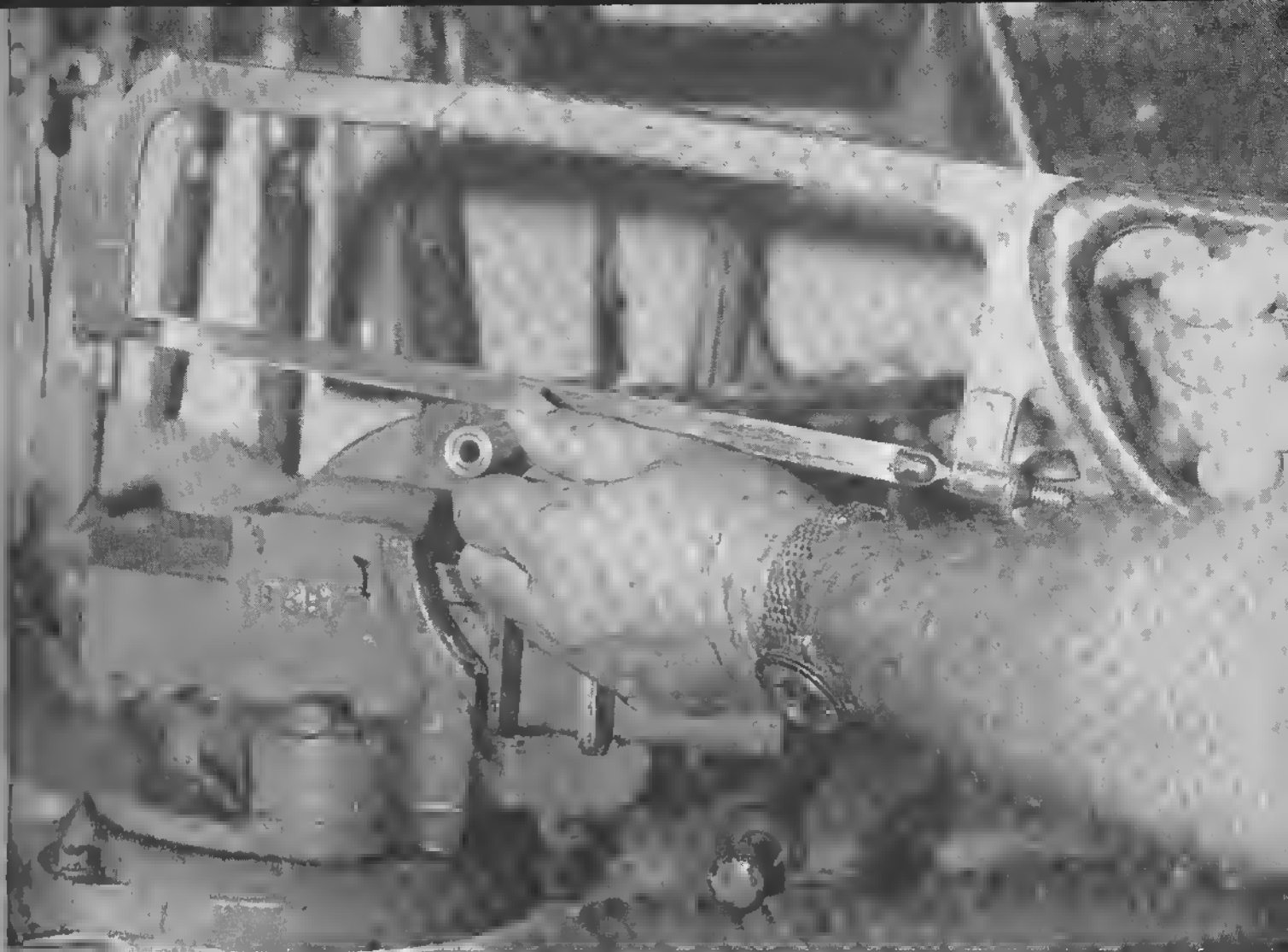
Appearances alone cannot reveal the quirks that make a rifle shoot erratically. Even a thorough visual examination of each part may fail to detect the fault.

Beginning with the action, the headspace was found to be perfect. The bedding, too, appeared to be as perfect as man could make it, showing no high spots that could cause barrel warp when heated. Tightness of the sights was checked for possible creep under recoil, but they were solid.

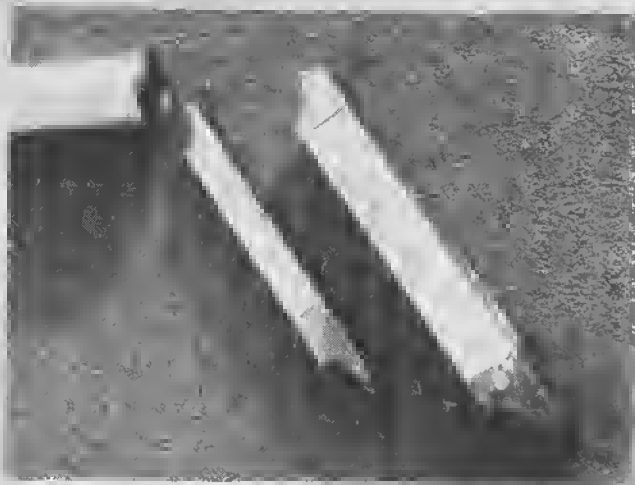
The premier-grade target barrel had been purchased as a blank, requiring threading, chambering and final finishing to the caliber desired by the purchaser. When purchased, the barrel was twenty-six inches in overall length, but had been cut to twenty-four inches in the final stage of finishing.

After several hours of close study of the rifle, I was about to give up when I recalled the owner saying that this had been a twenty-six-inch blank and had been cut to twenty-four inches. Then something began to turn in my mind.

It finally dawned on me that I had overlooked — and had forgotten to check — one of the most important factors that can mean the difference in a rifle being accurate and one that shoots like a shotgun. About three minutes after arriving at my workbench, I had nailed the trouble down as to why this otherwise fine rifle persisted in being so target erratic. The crowning of the muzzle had been done so haphazardly that the rifle could only spew out bullets in a general direction, with no accuracy.



Above: In cropping a barrel by hand, leave one-sixteenth inch for tilting, squaring the muzzle. Cut is made with a hacksaw with 18 teeth to the inch. (Left) The better grade barrels are crowned, ready for installation. Others are unfinished so that they may be shortened as required.



Special barrel crowning bits such as these in $\frac{1}{4}$ and $\frac{3}{8}$ inch are available for those who have a lathe available.

Before beginning to cut off the barrel, one should run a patch an inch down the bore. This precaution prevents the steel chips removed from dropping into rifle's bore.

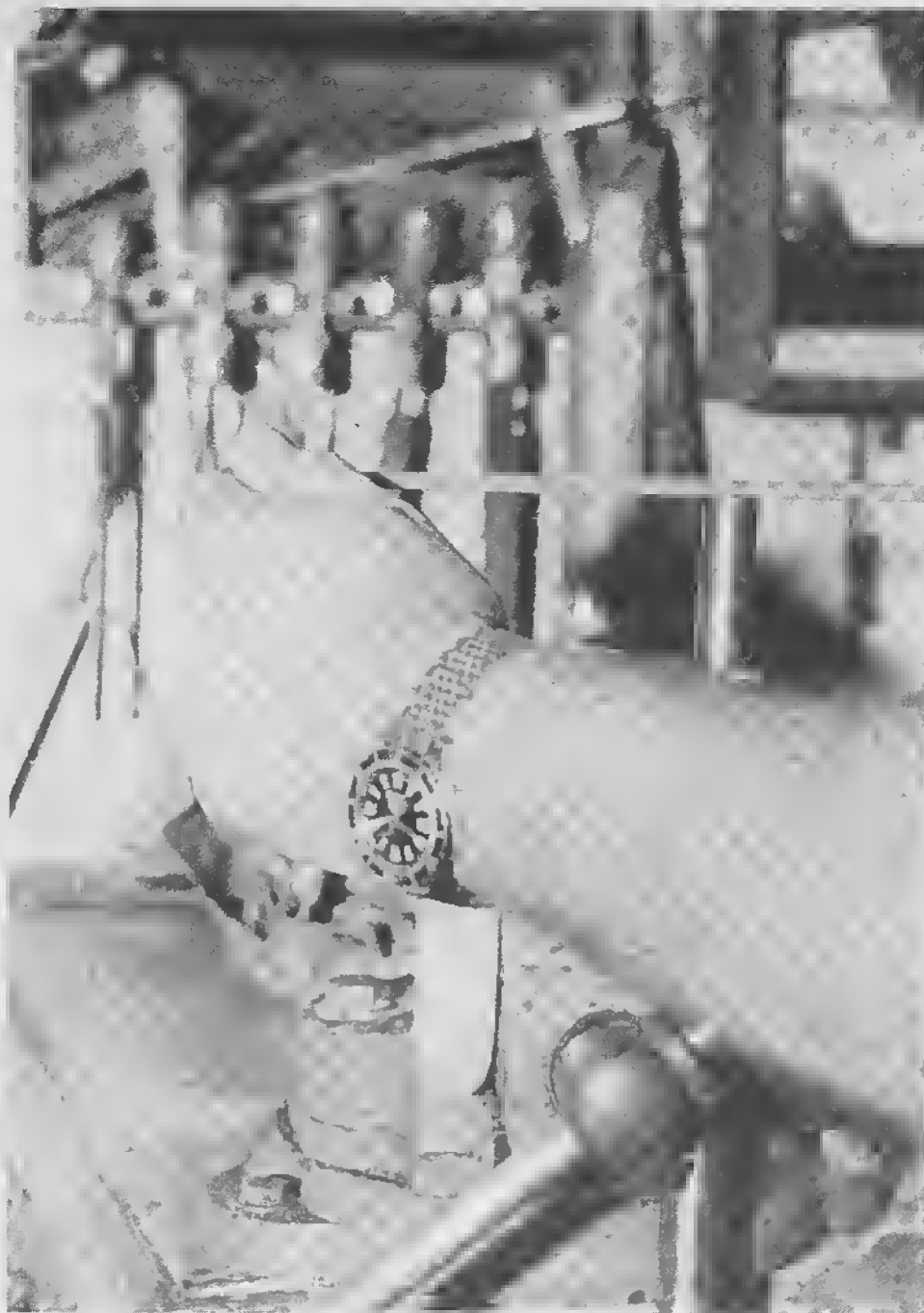


With a steel machinist's square, an assortment of files and a crown lapping tool, I soon had the crown of the barrel straightened up. At least, it was about one hundred percent better than it had been. Despite the fact that it was now about 1 a.m., I put through a call to my friend, getting him out of bed to tell him I was quite sure I had found the trouble. He wanted to jump into his car, drive the seventy-odd miles to my home and shoot the rifle then and there! It finally was agreed that he would be at my home about nine that morning.

Not yet explaining just what I felt the trouble had been — I wasn't absolutely certain that this was the whole trouble as yet myself — we arrived at the range, obtained a shooting station, placed our targets in the racks at a hundred yards, then crossed our fingers.

The first five shots from benchrest were all in the black, the group measuring about two inches in diameter! Following shots shrunk the groups to less than an inch in the hands of my friend. Eleven separate five-shot groups were fired that morning. The groups remained consistently under one inch. The erratic shooting of the rifle had been eliminated by only a few minutes of work, but several hours in the process of elimination were expended before the fault was detected.

An improperly crowned barrel means an inaccurate rifle and, the smaller and lighter the caliber of the bullet, the more erratic it will be.



Cut to the prescribed length, plus a fraction for finishing, the muzzle is filed with a 12-inch mill bastard file until square. The surface then can be finished with emery cloth wrapped on the file. Be sure of the file angle.

Proper crowning of a rifle barrel, as well as that of a pistol, means that it must be cut perfectly square so that the bullet will leave the muzzle with a true and equal bearing surface around its entire circumference. Should one side of the crown be low — as little as 0.001 inch and invisible to the eye — the escape of gases will be to that side, upsetting or tilting the bullet as it emerges from the muzzle. This results in erratic flight, even keyholing, if the bullet hits the target at all!

The best, easiest and most precise method of barrel

crowning is accomplished on a lathe, using specially ground barrel crowning bits. However, for the home craftsman, this job may be accomplished entirely by handwork if great care and precise workmanship are exercised.

For those who do not have a lathe, the best means of assuring a perfect barrel crowning job may be accomplished with nothing more than the few tools mentioned earlier: a machinist's steel square, a few files and a barrel crown lap.

The most important thing to remember in crowning a

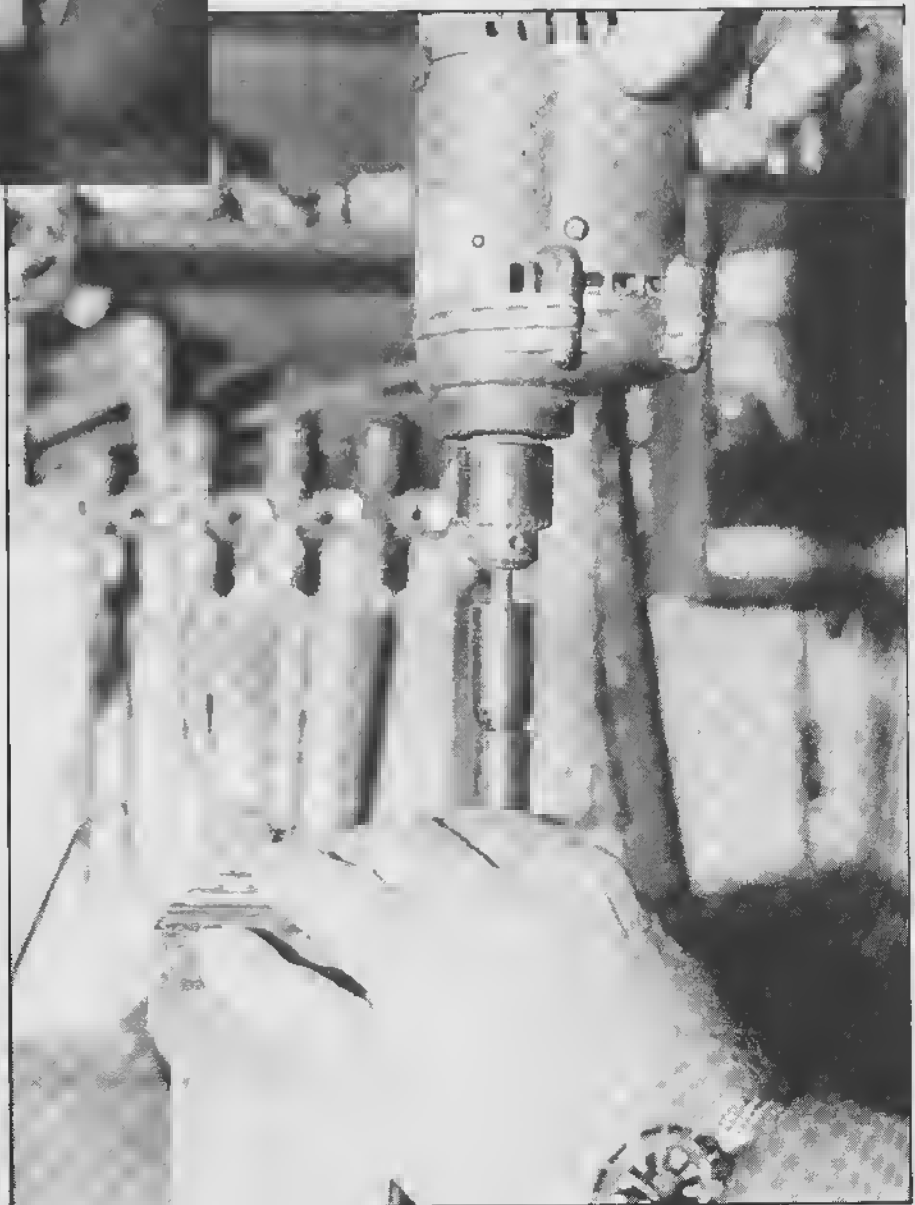


Above: During the filing of the muzzle it should be checked on a continuing basis for squareness, using a steel machinist square. (Right) Deburring the bore should be done with a crowning lap that is treated with a mixture of oil/600-grit emery dust. The lap is rotated by hand or power drill.

barrel by hand is that precision is the keynote. Remember that 0.001 inch I mentioned earlier? This is so slight as to be undetectable visually, but with careful use of the steel square and judicious use of the files and crowning lap, a perfect job is possible.

One may want to shorten the barrel of a certain rifle for ease of carrying or packing on horseback. Again, the best method is with a lathe, but it can be accomplished with nothing more than a hacksaw and the aforementioned hand tools. The cut is made with the hacksaw, allowing a full one-sixteenth-inch in additional length of the barrel for crowning and squaring up of the barrel.

Crowning on a lathe is a fairly simple job. It consists of merely lathing off the barrel to proper length. Then, changing to a crowning bit on the lathe, run this bit into the pre-squared muzzle until it has the desired roundness or crown. Should one possess a lathe, then these crowning bits may be purchased from Brownell's of Montezuma, Iowa, in the one-quarter- or three-eighths-inch size. Too, these tools





The crowning lap is coated lightly with the abrasive compound after it first has been coated with machine oil.

are extremely difficult to grind properly, so it is best to buy them already ground to the correct contour for barrel crowning.

Should barrel crowning be done by hand, during hack-sawing and filing, almost undetectable burrs of metal will be left around the edges of the newly cut crown. These burrs will be inside the bore itself and must be removed for a job that will result in greater accuracy. Some leave these minute burrs intact within the bore, maintaining that after a few rounds are fired, they will disappear anyway!

These burrs should be removed with the lapping tool mentioned earlier. This tool may be used in an electric hand drill. The rounded face of this lap is coated with a fine abrasive compound mixed with oil, then is placed squarely onto the bore of the barrel. It is rotated, either by hand or

power tool, until the burrs are polished away, leaving the bore unobstructed.

But the whole trick in a perfect muzzle crown is having it absolutely and precisely square! Any variation — however minute — will affect the bullet's flight.

A factor that must be taken into consideration, when using a machinist's square to square up a crown, is the possible taper of the barrel's exterior surfaces. This taper, slight though it may be, must be taken into consideration when using the exterior barrel surfaces as a plane by which to square up the muzzle. Should the taper be too pronounced, a precise instrument such as a dial indicator, must be employed.

But regardless of the method, that muzzle must be perfectly square to assure the best possible accuracy.

Chapter 19

THE BIG BUILD-UP

*There Are Techniques And Short-Cuts
For Building The Ultimate Shooting Machine!*

As the first step in putting together a custom rifle, the author gives the stock a quick inspection and makes some minor configuration changes in keeping with what he has in mind for fitting it to an Interarms Mark X action.



SOME YEARS ago, I participated in tests of a rifle stock of revolutionary new design. At that time, Carl Peterson, the late genius of the stock pantograph machine, was careful to point out that his new brainchild was probably the newest and most advanced innovation in gunstocks in centuries.

When I first eyeballed the unorthodox but beautifully finished piece of wood Peterson pulled from a rifle case, I shuddered. It was fitted, as I recall, with a Model 70 Winchester barreled action chambered for the .300 Winchester magnum cartridge. I tend to be a bit old-fashioned when it comes to sporting rifles and this is especially true where the design of the stock is concerned. However, the chunk of wood that Peterson presented as a rifle stock that day looked more like a crutch for some being from outer space!

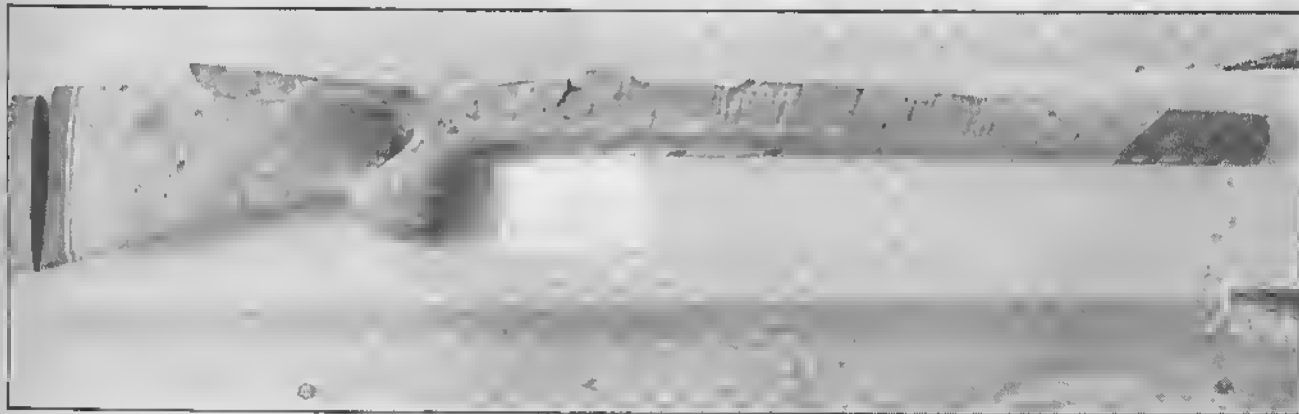
Out of respect for Carl, who we all admired for his artistry in wood carving, we tried to hide the looks of disbelief

that must have been apparent on our faces. Here was a so-called rifle stock unlike any other we had ever seen. It had little or no drop at the heel, the stock proper was wedge-shaped and the center of the pistol grip looked as though it had been used for target practice with a 20-millimeter cannon!

I thought it was the worst excuse for a stock I had ever hoped to see. The beautiful flowing lines of the classic stock were nonexistent, though, as stated, the wood was finished beautifully. So new was this creature that I had to be instructed in its use. It seemed that the large hole in the pistol grip area was for the insertion of the thumb, thus providing what was supposed to be a more-natural hold on the stock. This was fine. I agreed this was an acceptable feature. But the rifle raised to the shoulder, I would have bet anything, had the potential of kicking like a mule.

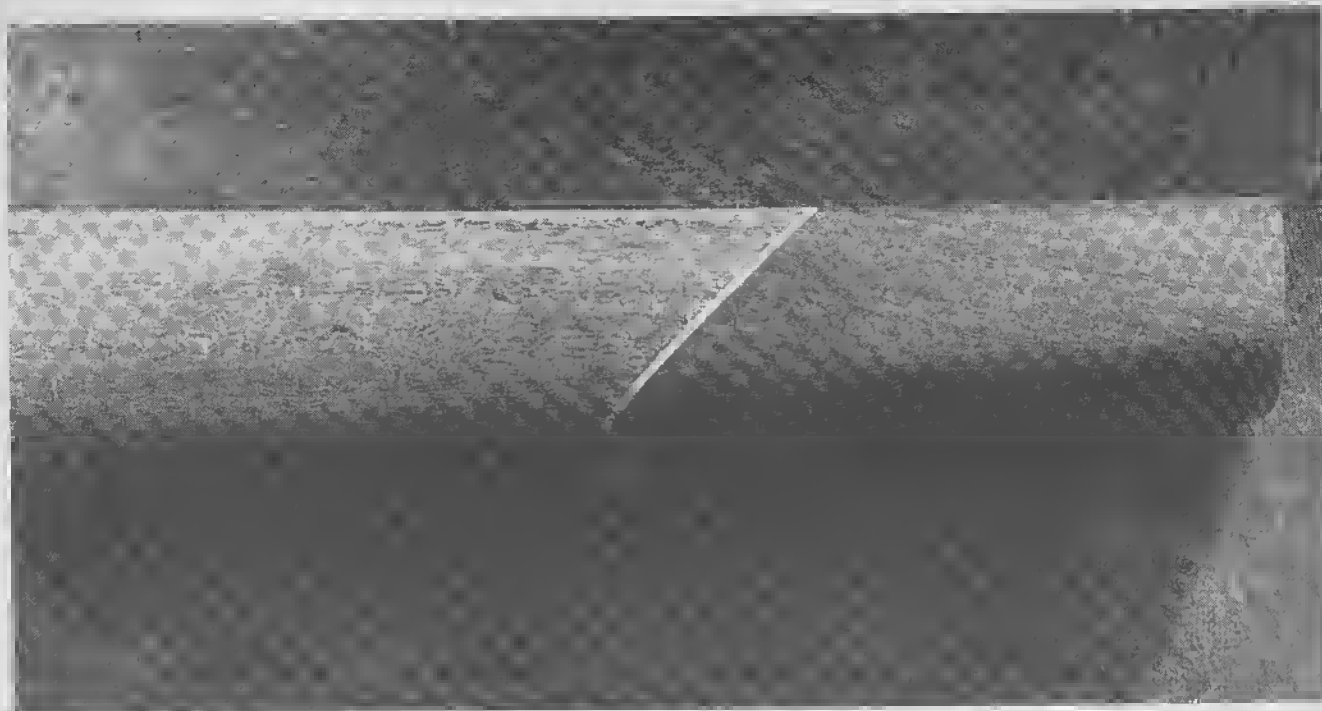
Here I was in for a major surprise. After firing several rounds, I found that recoil was all but nonexistent. The

Several stockmaking firms furnish thumbhole versions, including Fajen. Bish ordered one in semi-finished condition. He also favored the Pachmayr Presentation recoil pad, but found that stock had to be cut to attain proper length.

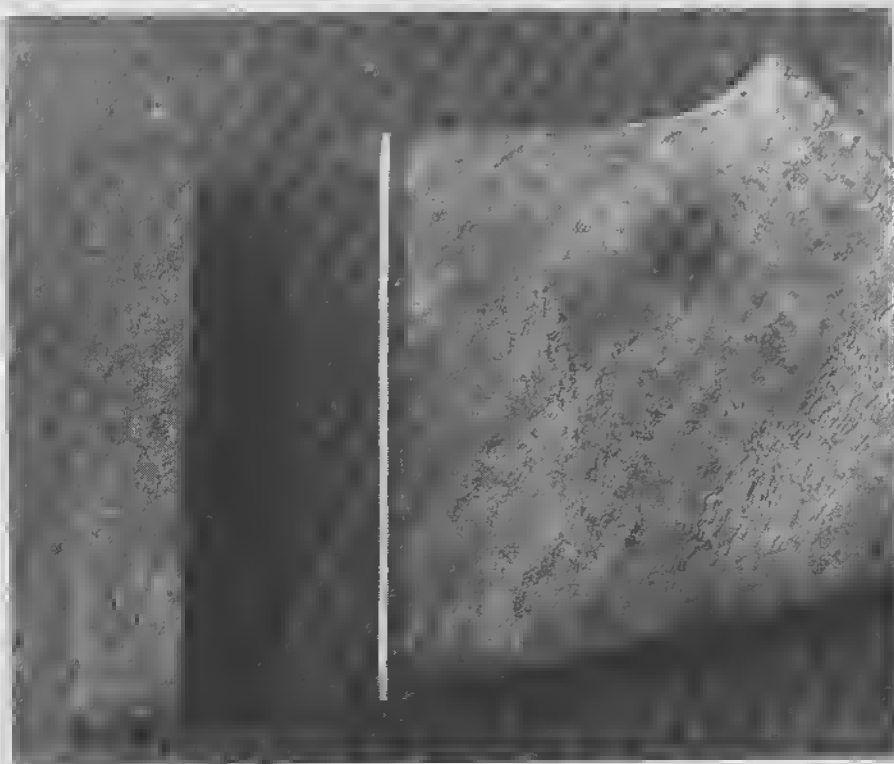


The Mark X Mauser action has the features required for a commercial sporter. It comes with an FN-type bolt sleeve.





As received, the forend of the thumbhole stock was cut square. During sanding, it was shaped to style wanted.



Before shaping and sanding the wood, the recoil pad is installed following contour of the stock. The thumbhole design requires that one-half inch in extra length be included in stock's overall dimension for a proper fit.

same was true with the second rifle tested in this unveiling, a 7mm Remington magnum. The testing of this new rifle ended with firing any number of rounds through both rifles, holding them at arm's length as though they were pistols. Carl Peterson seemed to have licked the problem of recoil in the big magnums.

Now, two decades later, the thumbhole rifle stock developed originally by Carl Peterson, has gained popularity the world over as the wood from which the recoil has been removed. Too, the overall appearance of this stock has been greatly improved over that of the original version. It currently is available with the graceful lines of the classic or may be had with a Monte Carlo-type stock having a full roll-over cheekpiece. But this is getting ahead of the purpose of this story.

In recent years, I have limited rifle building almost com-

pletely to those for my own use, plus a few built for friends for big game in Africa and Asia. I had never built a rifle with a thumbhole stock, stubbornly hanging onto my ideas of sane stock design. This would be my chance to build just such a rifle utilizing the somewhat still controversial Peterson thumbhole stock.

Several months went by as I assembled some of the necessities for such a rifle. One of the new Mark X Mauser barreled actions had arrived from Interarms of Alexandria, Virginia. I had suggested that the 7mm Remington magnum caliber be utilized, but the importers of this action sent one in .270 Winchester, which was rapidly available.

This action was manufactured in that era by Zastava of Yugoslavia for Interarms and was a typical Model 98 Mauser of commercial design. As available today, it boasts

The barrel was full floated in the stock before the job of glass-bedding was begun. Bish checks to be certain that there is the proper clearance in the inletted sections before applying type of bedding compound that he favors.





Though adequate, the standard Mark X trigger could not be adjusted. Bish used Timney trigger.

an FN-type bolt sleeve and a thumb safety located on the right side of the rear tang. The entire barrel and action are blued to a high luster and the bolt is factory honed for smoothness. The magazine is equipped with a hinged floor plate with push-button release and the receiver is drilled and tapped to accept most popular American-made scope mounts.

I decided to use a Timney trigger with a thumb safety in lieu of the one furnished on the Mark X action as standard

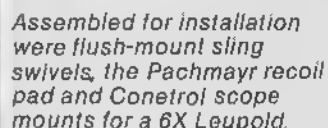
equipment. While this Mark X trigger and safety are adequate, I don't feel it has the vital adjustments and sensitivity of the Timney. Conetrol scope mounts were selected for installation on this rifle. The Peterson designed stock would be fitted with such accessories as a Pachmayr Presentation recoil pad, flush mount sling swivels also by Pachmayr and would be finished with Lyman's newly produced stock finishing kit.

Among the last needed accessories to arrive was the

However, as I prefer to thoroughly glass bed any rifles I build, additional clearance had to be rasped from the barrel channel. This clearance requires a fill space of at least one-sixteenth-inch for the glass bedding compound. Also, I prefer to bed not only the entire barrel and recoil lug sections, but the receiver and rear tang as well. Complete glass

As of this writing, thumbhole stocks are available from Reinhart Fajen, Inc., of Warsaw, Missouri, in grades of walnut varying from supreme to semi-fancy. The supreme grade is the top of the line as far as beautiful configuration of grain is concerned. These thumbhole stocks are available in the Mannlicher-type stocked to muzzle as well as the conventional forearm design.

First, the barrel is bedded back to and including the recoil lug, then the action is removed from the stock, the



metal recoated with releasing agent and the complete receiver section glassed. When cured, the action once more is removed from the stock, recoated with releasing agent, then the entire rear tang section is solidly seated in glass. Properly done, a rifle finished in this manner is less apt to change its point of zero due to stock warpage, a condition especially prevalent in damp weather.

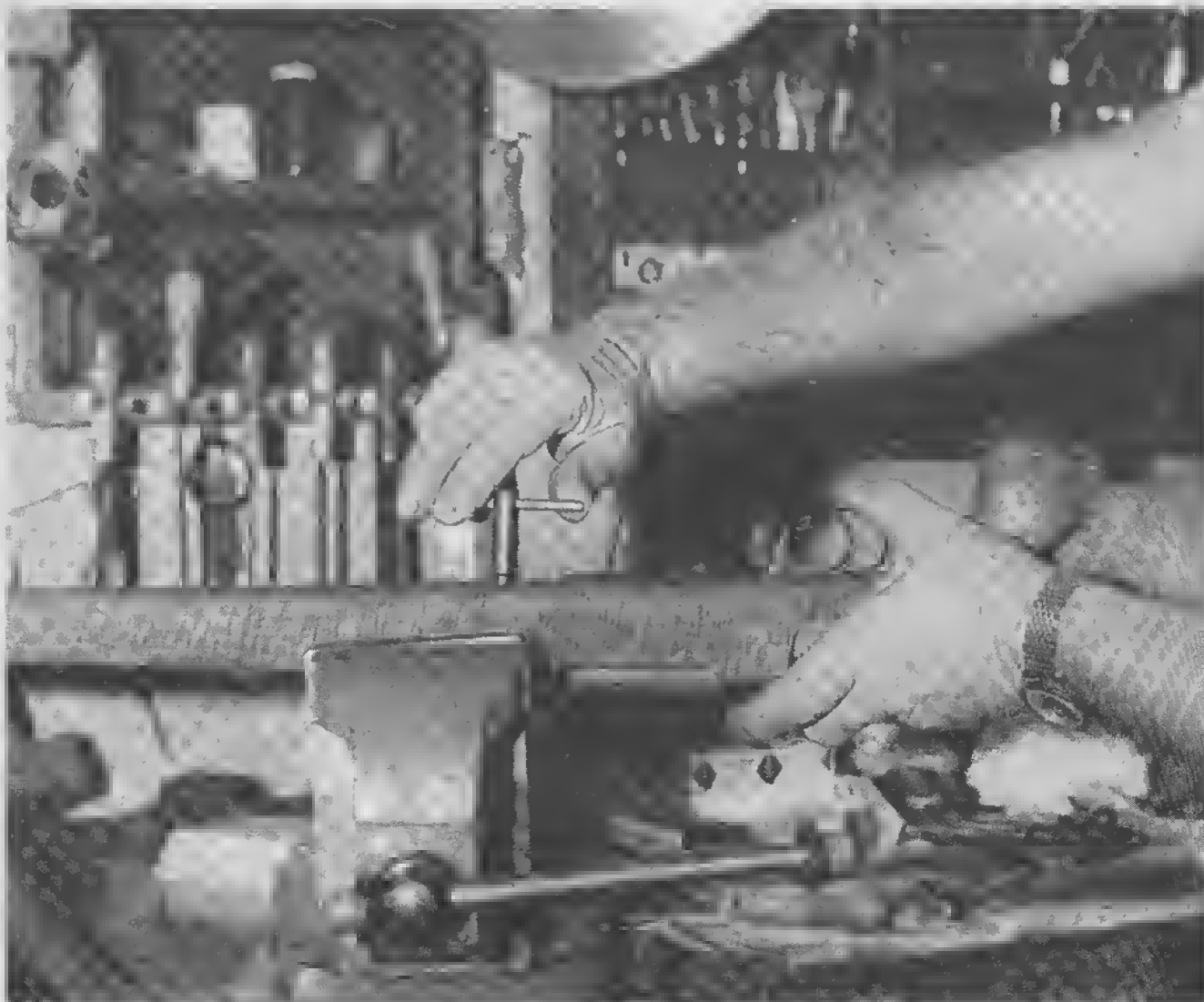
Once the barreled action is inletted and glassed, one must file and sand the stock to its final configuration. As received, the thumbhole stock requires that a recoil pad be installed, the forend shaped and the stock and pistol grip section be custom fitted to the individual who will use this rifle.

While the stock proper and pistol grip section is pre-

shaped, it still should be precisely fitted for comfort to the individual. This is accomplished first by placing the rifle to the shoulder in the conventional manner with both eyes closed. With the head in a normal, upright position, open the right eye and sight the length of the rifle.

Chances are that it will be noted that the head is too far to the left for the line of sight to be straight down the top of the barrel. This means simply that the cheek rest is too thick. Plane or rasp the rest until the eye sights directly down the top of the barrel with no neck craning. During this phase the length of the stock is noted. As a rule, the length of pull of a thumbhole stock should be approximately one-half-inch longer than a conventional stock. This includes the thickness of the recoil pad.

With the glass-bedding compound applied, the action then is tightened into the stock, using stockmaker's screws. The rifle then should be set aside for twenty-four hours to allow the compound to harden, cure and form to action.



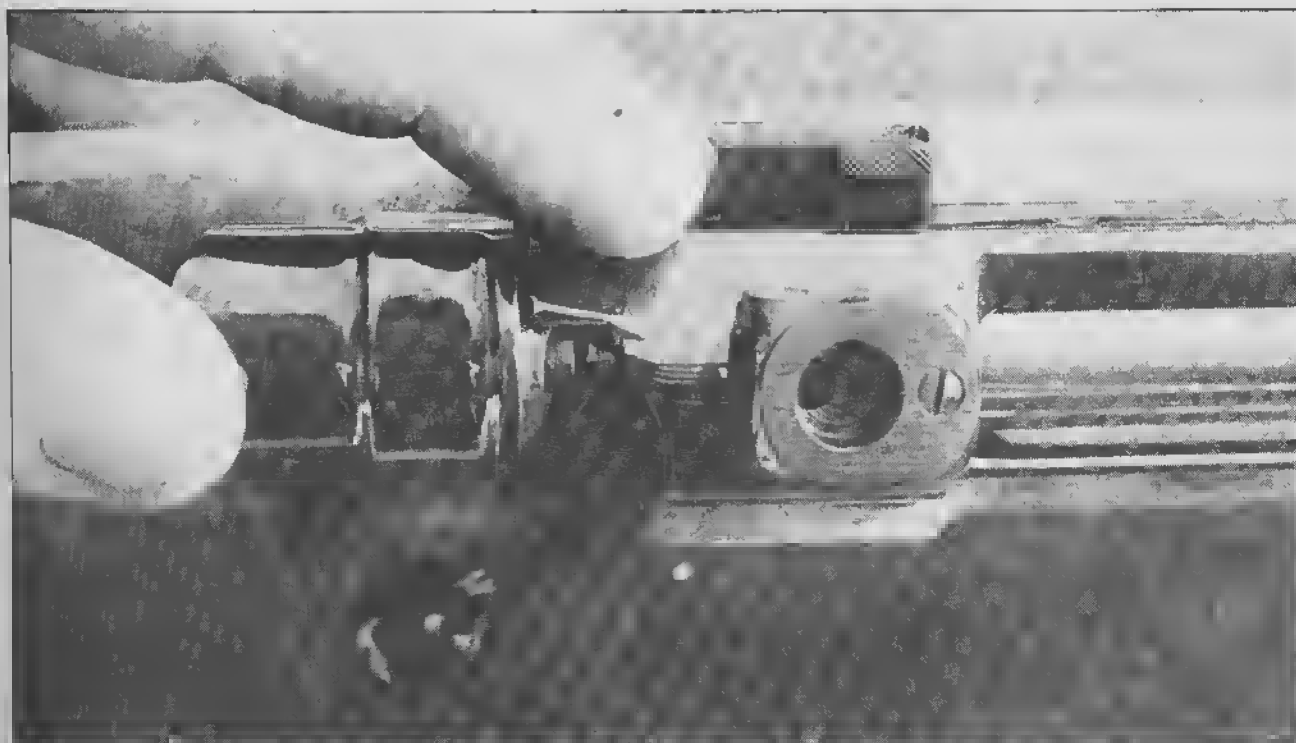


With the action in the stock, Bish checks out thumbhole to determine whether it meets the contours of his hand. In some cases, adjustments must be made in the size and contour of the thumbhole, but this must be done carefully.

There are innumerable little things that may be done to both a commercial barreled action and stock to turn them into something special. Let's take, for instance, the bolt release lever, that little gadget located on the left side of the Model 98 receiver. In the majority of cases — especially on commercial actions — this one feature often is taken for granted by most rifle builders, whether amateur or professional. The

wood of the stock is cut, shaped and sanded around it with no thought as to what might improve its function even the slightest bit. I have found that checkering the top portion of this thumb-operated lever can improve its function. Too, it is a matter of only a few minutes to relieve the wood around the contour of this lever sufficiently to allow a one-sixteenth-inch fiberglass spacer to be epoxied in place. Not

The raised finger lever of the bolt release may be checkered with metal checkering files. This, the author feels, will add to the appearance of the finished rifle, as well as aid in the practical use of the component in the field.

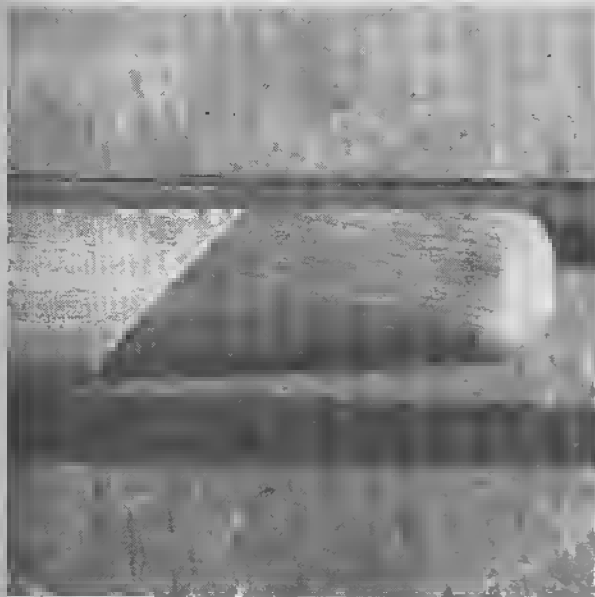




Perfect roundness of the forend is achieved with files; work the surface to be shaped with a rocking motion of the file.



Forend is rough-shaped with disc sander or files, then is finish shaped with sandpaper.



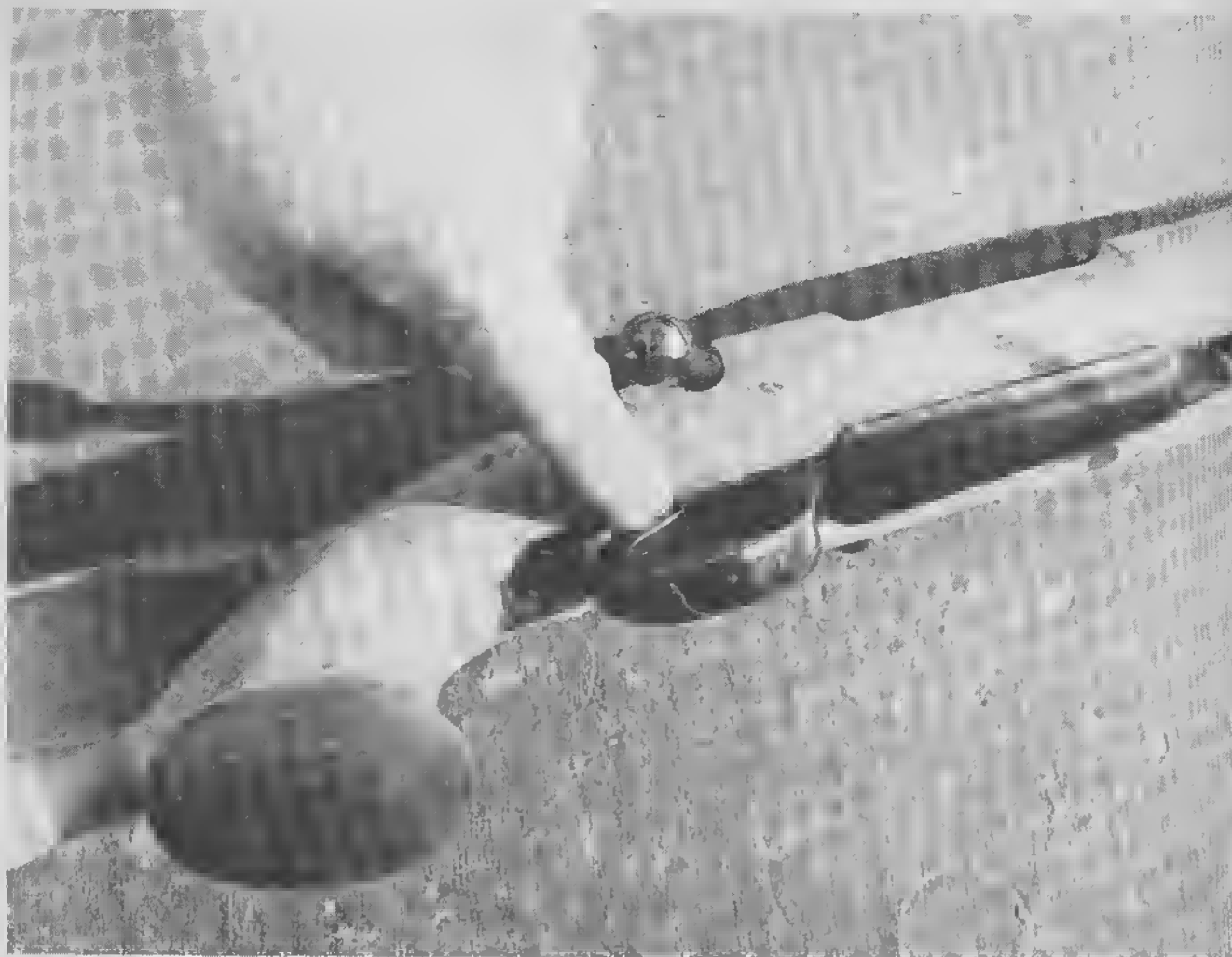
Although a forend may be developed in numerous shapes, round contour was used on this rifle to avoid the brush hook style. The forend shown is in the early stages of finish. (Right) Timney Target Master trigger with thumb safety has been installed in the action. Beneath is standard trigger, safety from the gun action.

only does this seemingly simple bit of customizing improve the appearance of the finished rifle, but it smooths the operation of this component.

This thumbhole stock requires that the tip of the forend be shaped in accordance with the builder's tastes. This section may be rounded, swept back, semi-rounded with flat sides or finished in any other combination of shapes. However, in doing this portion of the stock, it is best to stick to sane and proven designs. I never have approved of swept-back or undercut forend caps, because they are nothing more than glorified brush hooks.

As mentioned, I had decided to replace the standard Mark X thumb-safe trigger with the Timney Target Master. This particular trigger is furnished with a serrated trigger measuring three-eighths-inch in width that required the trigger slot in the Mark X trigger guard be enlarged. The original trigger of the Mark X measures approximately $7/32$ -inch in width against the full three-eighths-inch of the Timney. This means that the trigger slot has to be widened by about $5/32$ or about $3/32$ on each side to accommodate the wider trigger in a frictionless fit.





The Timney Targetmaster trigger measures three-eighths-inch in width, requiring that the slot in the trigger guard housing be made wider so that the trigger would fit and function properly. This takes careful work.

The sear slot in the rear tang had to be elongated slightly to accept the sear of the Timney. This is accomplished, should it be necessary, with small needled files. The sear of the trigger must have full freedom to move within this slot for positive functioning of the action.

Once the trigger assembly is installed, should one care to replace the standard Mark X versions with a more refined unit, the full forward Mark X safety with a more thumb lever is marked onto the tang of the rifle with a silver leaded pencil. These marks will act as guidelines by which the stock might be inletted to accept the lever in a precise fit.

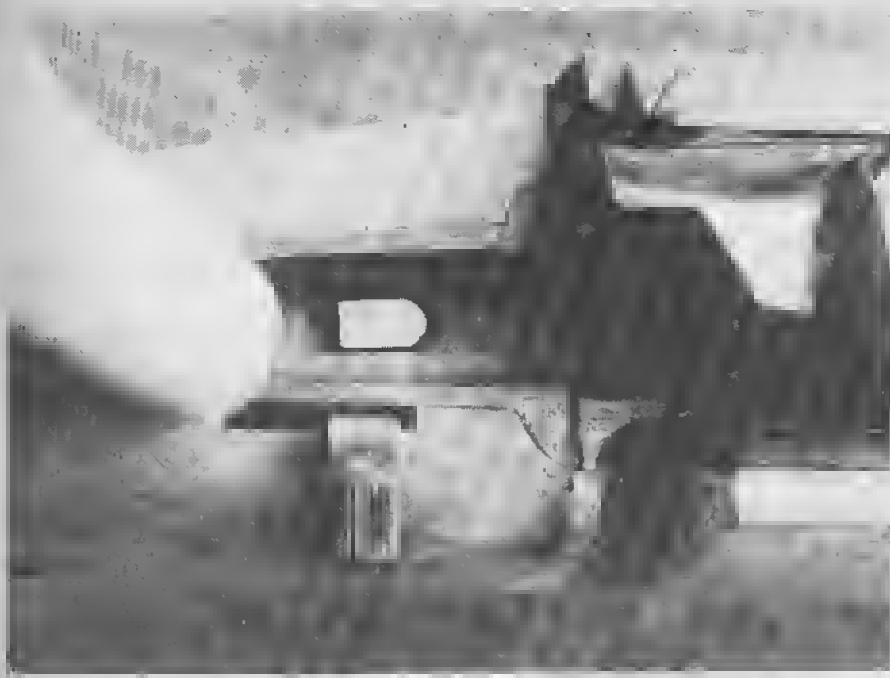
Yet another innovation that spells "special" to any rifle stock, though a minor operation in itself, is to cut a tapered mortise in the stock directly below the loading port of the receiver. The entire conformation of this mortise may be a variety of shapes and sizes, according to the individual's own tastes, but it is best to keep it simple. During the final

sanding, the edges of the mortise may be sharpened, giving this one feature a distinctive appearance.

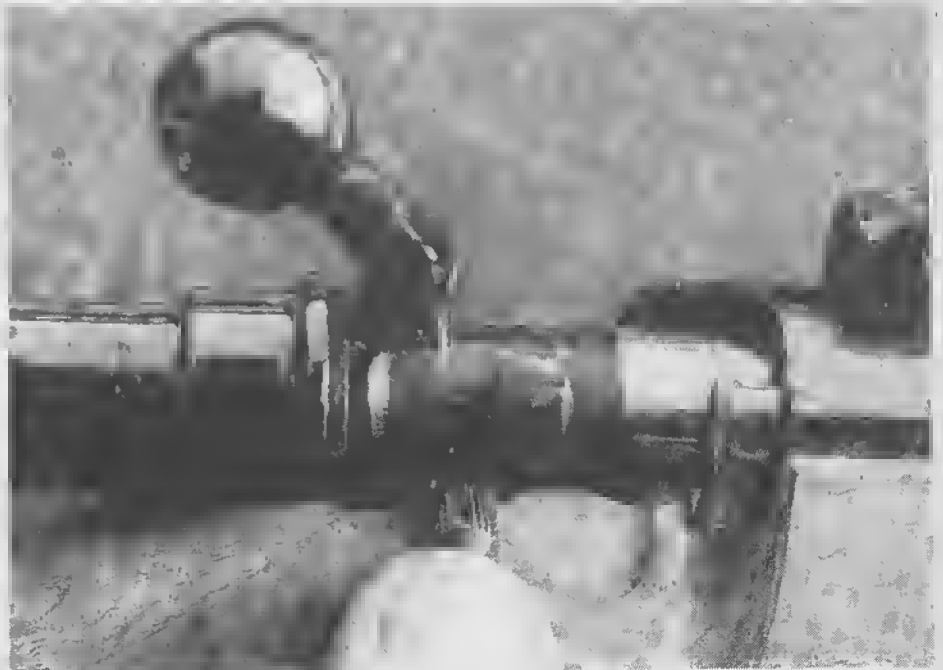
Otherwise good rifle stocks are all but ruined during the final sanding and shaping. It is best to take your time. Cover the recoil pad with masking tape to keep it from being shaped poorly or soiled during sanding or application of a liquid-type stock finish.

The thumbhole area of the stock should receive more than special attention to assure proper fit of the hand. However, don't remove too much wood unnecessarily. It could weaken the stock. Finally, when the stock has received its final sanding and is glassy smooth, ready for application of the liquid stock finish, the sling swivels are installed, at least temporarily.

While there are many types of swivels available today, those produced by the Pachmayr Gun Works of Los Angeles, California, were selected for installation on this rifle. (Mounting procedures for these sling swivels are covered



Sear slot in the Mark X action, though standard, had to be made longer with files to accommodate the new Timney trigger assembly.



The thumb piece of safety lever should be bent to conform to the stock contour with 1/16" clearance.

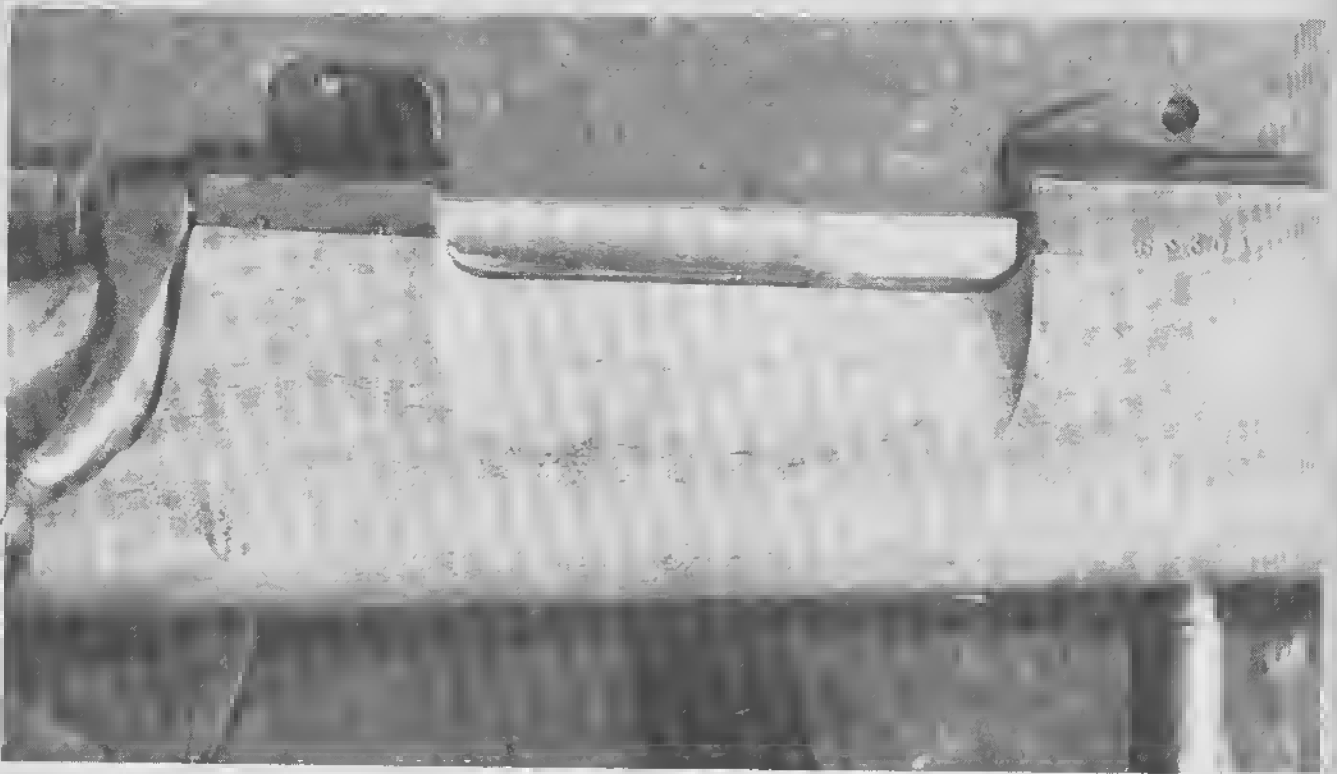
in detail elsewhere in this book.) Once installed, the bases are flush with the wood. The swivels themselves are fully detachable by pressing the swivel slightly then turning counterclockwise. They are installed by reversing this procedure.

The swivel bases, after installation, are removed from the stock for application of the initial coatings of stock finish. Earlier, we glass-bedded the barreled action into the wood of the stock in a snug, almost press fit. To assure that this glassed area receives none of the liquid finish, it is best to mask off all areas covered by the glassing compound. At the same time, make certain that no portion of the masking tape overlaps any portion of the stock that is to be highly

finished. A razorblade can be utilized to trim off excess masking tape.

Available today are preparations with highly refined oils compounded in their makeup, such as George Brothers' Lin-Speed oil, Casey's Tru-Oil and several others. There also are those preparations having a glass base such as Brownell's Acraglas and Bichwood-Casey's polyurethane stock finish. I have used literally gallons of each to produce some pretty good results in my time. However, one of gun-dom's oldest firms, the Lyman Gun Sight Company, has a kit known simply as the Lyman Stock Finish kit. I decided to give it a try.

This kit includes everything necessary for producing a



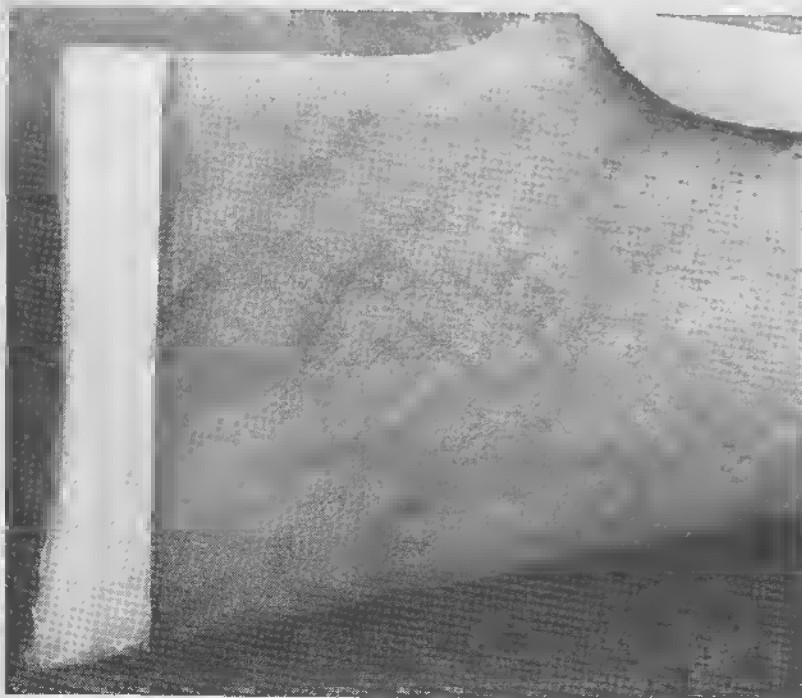
Loading area of the stock can be mortised to provide a custom appearance to the finished stock. This mortise, according to the author's thoughts, can vary in size or shape to conform to the desires of the firearm's owner.

high, mirror-like finish to any gun stock. Included is one bottle of gun stock filler, one bottle of finish, a can of liquid for removing the finish from old stocks, sandpaper, steel wool, a rubbing pad and full directions.

It must be mentioned that unless the wood is sanded thoroughly, removing every minute scratch, then sanded

with wet-or-dry paper in extra fine grit until glassy smooth, the final finish will look like hell, no matter the amount of liquid finish applied! The major effort in stock finishing is expended in the sanding.

The various grades of gun stock walnut appear to have surfaces filled with minute holes or pores. Regardless of



Once installed, the Pachmayr Presentation recoil pad is covered with masking tape to protect it until rest of stock is finished.



The hand grip section of the thumbhole stock must be sanded and shaped to fit the hand of the user. This is especially true of the area where thumb protrudes.



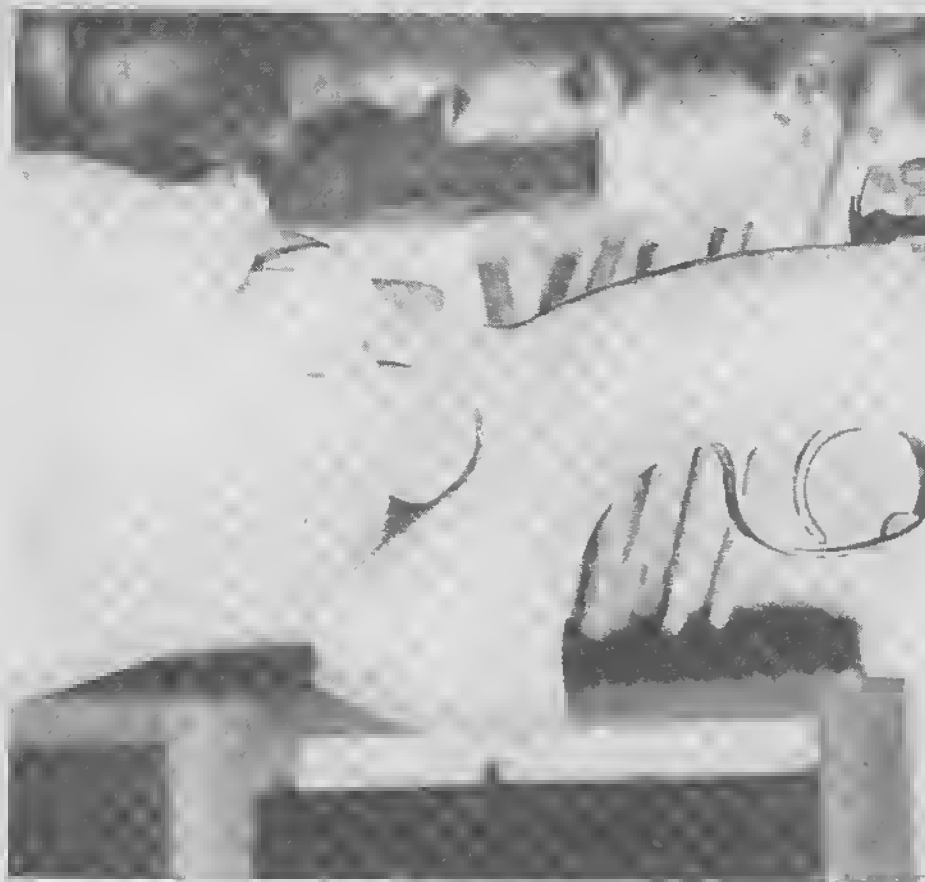
The best method of sanding the thumbhole is to wrap garnet paper around a finger, using digit as sanding block as shown.

the amount of sanding, these pores will be prevalent over the entire surface. They must be filled completely to produce a stock that is glassy smooth. Using Lyman's gun stock filler, follow the directions on the bottle to the letter in applying and allow sufficient drying time. If correctly applied, it will be noticed that the holes or pores in the wood are filled completely to the surface of the wood. It is now time to begin the application of the final finish.

The application of the liquid finish is a simple matter, if a small spray unit is available to the builder. However, lacking this piece of equipment, one may apply the finish with

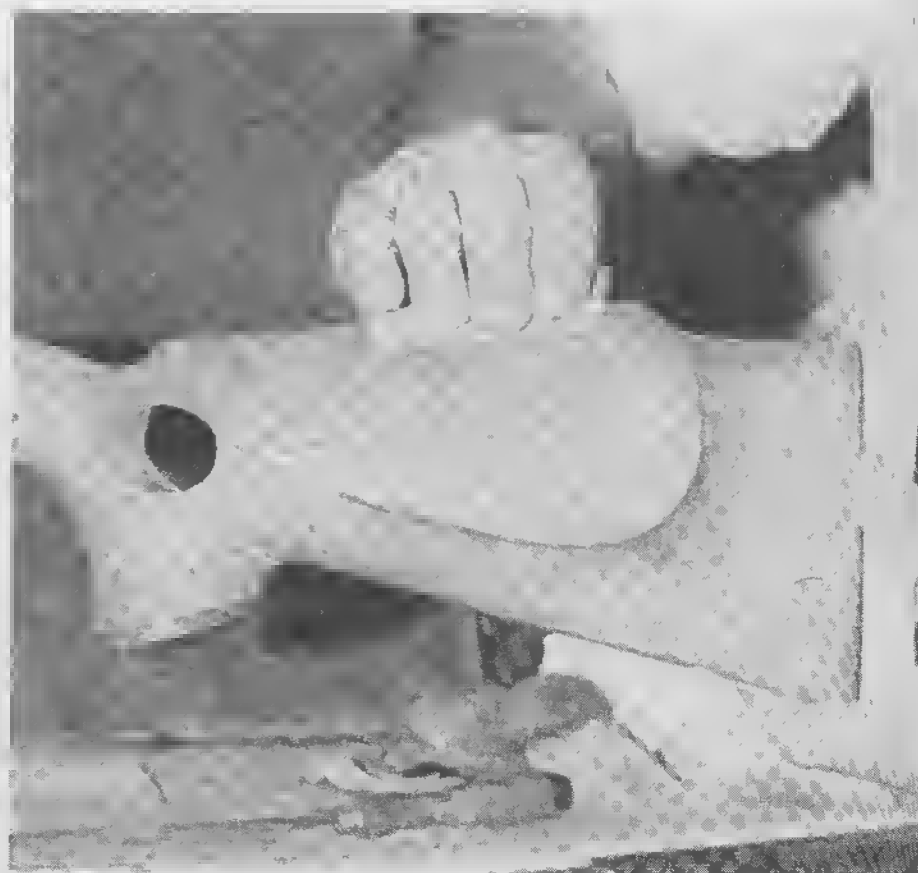
his fingers or a small, soft-bristled brush. Take care to apply the finish evenly and over the entire surface. Avoid lap marks if possible and do not go over portions already coated with the finish while still tacky.

Allow the first coat to dry thoroughly for at least twenty-four hours, then sand lightly to remove any irregularities in the surface. Dust well with a tack rag, apply the second coat, allow it to dry, then apply the third coat. As a rule, with the use of the filler, three coats will be sufficient to produce a glass-like finish to the wood. Allow this to dry for twenty-four hours or longer, if possible. The final phase in



The large hand mortise on right side of stock should be sanded to a satin finish. To accomplish this, Bish favors a medium grade, then fine grade garnet sandpaper.

Final sanding is most important step in stock building. Keep the corners, edges reasonably sharp and remove all minute scratches from surface before oil finish.





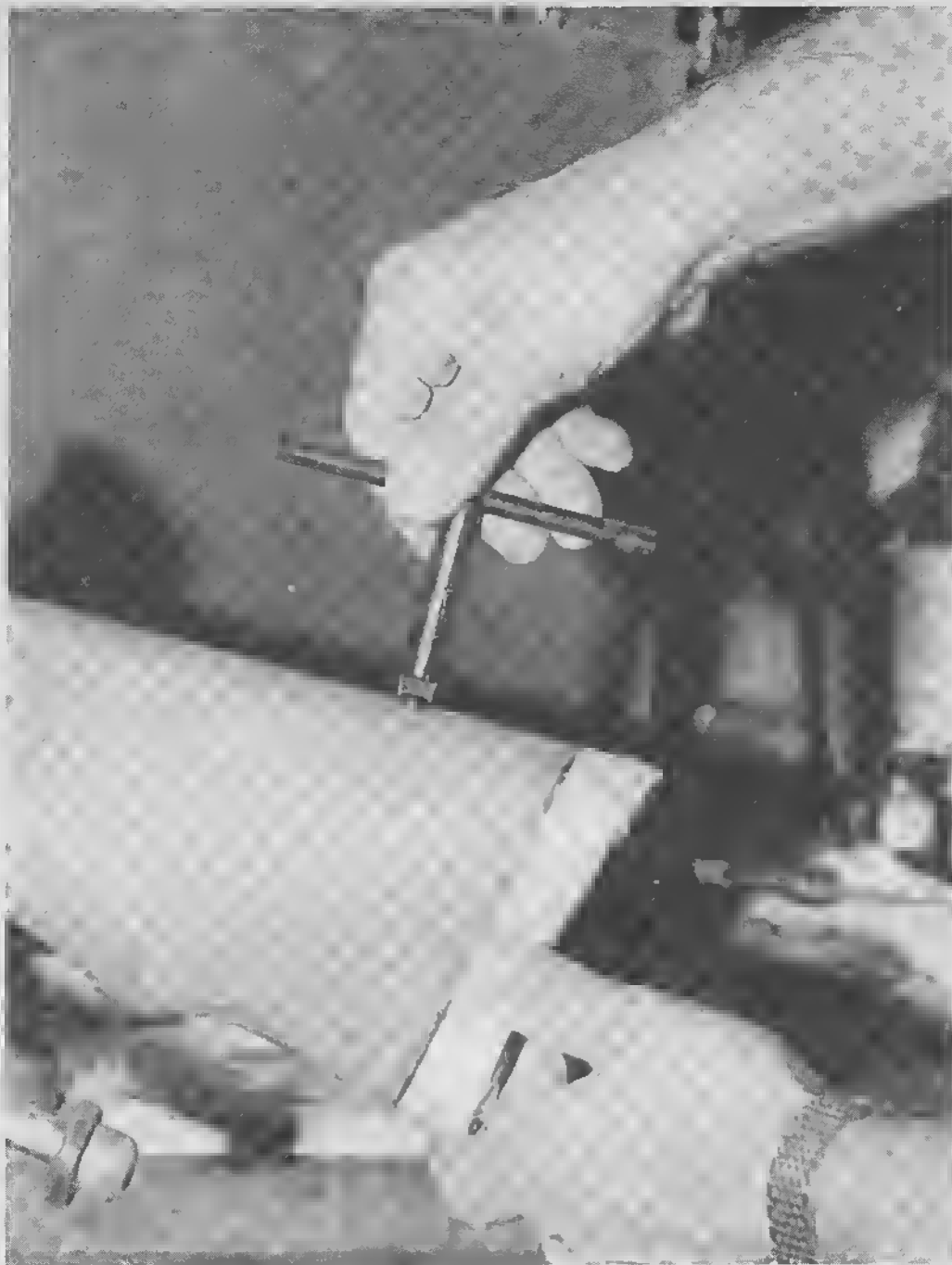
After stock has been sanded completely, the flush mount swivels are installed. Bish used a special jig for this.

finishing a gun stock is to rub it down with a good stock rubbing compound. I have found that Brownell's stock rubbing compound does the job best for me. This compound is supplied by Brownell's of Montezuma, Iowa, in either a four-ounce can priced at \$1.44 or a pint can for \$3.33.

The four-ounce can is sufficient to do several stocks and produces a satiny smooth finish to the surface. Once again, great care should be exercised in using this compound. To literally scrub the surface with it could remove the built-up finish to the surface of the wood itself, so avoid this. Merely

rub the surface with a dampened cloth pad saturated with the rubbing compound. Rub first across the grain, then finish up with strokes the length of the stock. When the desired surface has been achieved, give the entire stock a thorough coating of a good paste wax, then hand buff it to a luster with a soft, clean cloth.

The stock finished, its surface glassy smooth and well waxed, we turn our attention to the metal work on the barrel and action. It is probable that all metal work may have received a light coating of wood dust from the sanding



The swivel bases are installed temporarily into finish-sanded stock with the T-wrench that is designed specifically for the purpose. The bases must be removed during application of oil finish.

operations on the stock. Wash the complete unit, barrel and receiver, bolt, trigger guard housing and both receiver screws in solvent, allow them to dry thoroughly, then coat sparingly with a light gun oil.

Should a scope be desired, now is the time to install it. Used on this rifle was a Conetrol scope base and rings in Custom-grade. The Conetrol was topped with a Leupold six-power M8 scope with a duplex reticle. It was then ready for its first trip afield.

The moment of truth in building any sporting rifle, whether a surplus military or commercial action, is arrived at only when the stock has received its final coating of finish and the barreled action is installed and tightened into its mortises, then equipped with the desired scope or open iron sights. The rifle then is ready for its first trip afield for performance testing.

The quality of the workmanship, plus the knowledge exercised by the builder during those long hours at the



Once the Mark X custom rifle is finished and assembled, the problem still remains as to whether it will shoot with the desired degree of accuracy; that means a trip to the local shooting range to find out. (Below, right) Added to the rifle is the Cobra sling by Bianchi Gunleather, which incorporates in its design a cartridge pouch with a snap closure. The pouch will hold four additional rounds in most calibers. Blsh feels it is excellent for carrying afield.

workbench should determine just how reliable and accurate the finished rifle might be.

Classed as exhibition grade walnut, the stock of the completed rifle carried its beautiful configuration and colors from the rearmost sections of the butt all the way to the tip of the forend cap joint. No photograph, either black-and-white or in full color, could possibly capture the full beauty of this piece of wood. In my gun rack, it most certainly would be for show purposes rather than for hard use in the tall timber. I would judge that a piece of wood such as this comes along at a ratio of about one in a thousand.

As stated earlier, the moment of truth in any newly built custom rifle is when it is taken afield for the first time for test firing and accuracy. This rifle was no exception. Regardless of the quality of materials used, there is always that possibility that something could be faulty, either in the bedding of the stock or the action itself.

Just prior to taking the rifle to the range, the Conetrol scope mount was removed from its temporary setting on the rifle's receiver, then securely remounted, using minute amounts of epoxy cement thinly applied to the base of the scope mount contacting the rifle's receiver, Loc-Tite cement was used on each of the four base retaining screws.

The base securely in place, the 6X Leupold scope then was placed in the rings in a snug but not tight fit on the base. This allowed for final placement of the scope for proper





With the moment of truth upon him, the author contemplates the target at Los Angeles County's Fish Canyon Range.

eye relief. This was quickly determined by holding the rifle to my shoulder in a normal manner, sliding the scope back and forth until the proper eye relief was determined. The rings then were tightened with the Allen wrench furnished with each Conetrol scope mount, making certain that the crosshairs of the scope were in perfect alignment with the rifle's bore. Finally, with the use of a Sweazy collimator and a final visual bore sighting, the scope was brought to a hundred-yard zero.

The preliminaries to checking any new rifle prior to firing on the range or in the field are known to knowledgeable riflemen. The most important item of such an examination should be the bore and chamber. In the case of a new, factory-built rifle the bore must be inspected closely and

cleaned of any preservative grease that might be present. The same is true with any rifle built by the home craftsman. There is bound to be a certain amount of wood dust, shavings and even grit from sandpaper that has worked its way into the more remote and inaccessible crannies of the chamber and interior of the bolt. Such a rifle should be washed thoroughly in cleaning solvent, then checked and rechecked for any remaining foreign substances. When thoroughly cleaned, all working parts should be given a thin coating of a good gun oil and the bore swabbed dry prior to actual firing.

While this may sound elementary, many fine rifles are ruined, simply because they weren't checked in such a manner before being fired.



All of the test rounds were fired from a benchrest of special design. Recoil experienced with the thumbhole stock was found to be negligible, which is one claim that has been made for this stock design from its introduction.



Ammo used in test was 130-grain Winchester Power-Point In .270. The first shot was out of black, but when the scope was adjusted, all rounds were in an inch group.



The six-power Leupold scope, held in place with Conetrol mounts, was fully stable and required little effort to bring to zero. (Left) Jack Lewis, for whom the custom rifle was built, checks it in his office.



The author is satisfied with the results of his efforts after he checks out the first test target.

I won't go into any long-winded narrative about concoctions of homebrewed ammunition fired nor will I claim any credit for its performance as a damned good rifle! All I did was put the thing together, with a degree of loving care, then hope for the best. Despite the fact that I have been a devoted reloader for more years than I will admit, I chose factory-loaded .270 Winchester 130-grain Power Points for the testing.

With the supply of test ammo, a Weatherby spotting scope, a portable benchrest — and high hopes — I headed for the rifle range, located at the base of the rugged San Gabriel Mountains. It was an ideal day, the weather was perfect and not the slightest wind was blowing.

As I removed the new rifle from its protective case, a number of shooters from nearby stations wandered over to take a look. Their first comments concerning the rifle were, "Where in the world did you ever get a piece of wood like that?" Then there were ohs and ahs from other shooters who wandered down to my shooting bench.

After satisfying the curiosity of neighboring shooters, I prepared the rifle for its maiden voyage into the realm of burning gunpowder. Five rounds were loaded into the magazine and the bolt closed. The duplex reticle of the Leupold scope was brought to bear on the dead center of the hundred-yard target and the trigger touched off.

A quick check through the spotting scope showed that this first shot had struck, punching a clean-cut hole about

three inches out of dead center at six o'clock. A slight adjustment to the top turret of the scope brought the perforations in the target up into the black, but still about one inch to the right of the X ring. Additional minor adjustments of windage and elevation knobs produced groups resembling clusters of salmon eggs, all holes hung together, each overlapping the other and about one inch high from dead center of the X ring; ideal for hunting purposes.

As a result of the favorable weather conditions, plus the rifle performing as it did with all but that first shot out of the black, I left the range a pretty happy guy. This is one of the finest rifles, performance-wise, that I have ever built. Despite my earlier contempt for the lines of the thumbhole stock designed by Carl Peterson those many years ago, I now can say that this new version is one of the most comfortable and best shooting stocks I ever have had to my shoulder. It is still the wood from which the recoil has been removed!

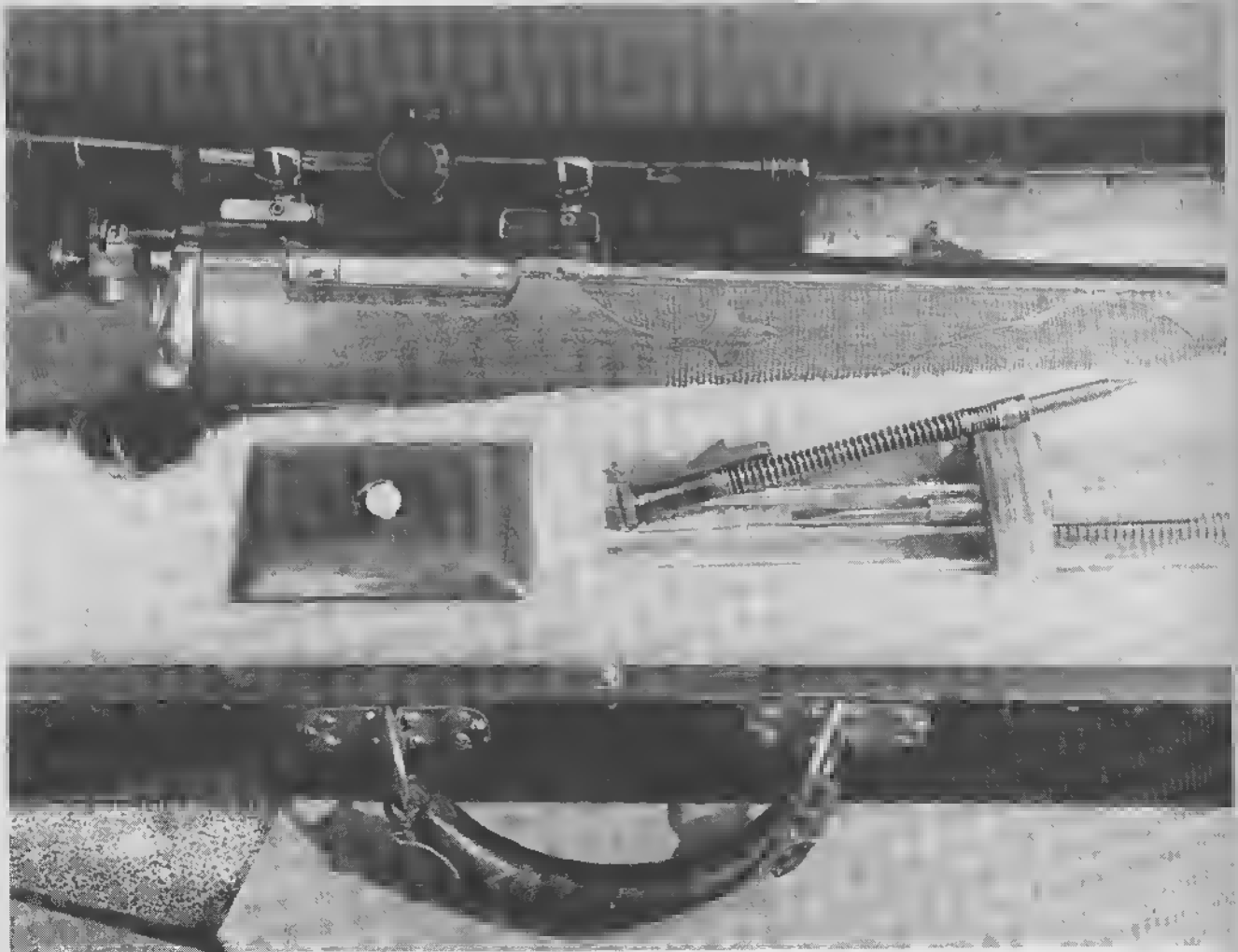
I always have made it a practice, when possible, to apply a final finish, then allow several weeks before this finish is rubbed down to a final, flawlessly smooth surface. All range testing is done during this curing period and prior to giving the stock its last hand-rubbed and waxed finish. I have found that the longer the finish on the stock is allowed to cure, the prettier it will be when finally rubbed out and waxed.

Chapter 20

ANATOMY OF A FIRING PIN

This Bit Of Metal Is The Heart Of Any Firearm

In spite of all the care that went into customizing this rifle, if the firing pin isn't adequately designed to do its job, the whole project can be considered a failure. The author expresses his thoughts, recommendations here.





This photo has been blown up to several times the actual size of the subjects so we can see that the modern Mauser firing pin proved a fraction too long. It pierced primer completely, was shortened to right length to correct.

THERE ARE few knowledgeable men in the world of gunology who won't agree that the firing pin can be classed as the heart of any firearm, whether rifle, pistol or shotgun. The quality, the amount of engraving gracing the piece, or the quality of inlays, don't enhance the gun's use factor, if it won't fire!

Encased within the bolt, breech block or frame housing of every sporting firearm is that often tiny piece of metal. Should this component become broken, misshaped, shortened, dulled or malformed for any reason, the gun will fire spasmodically or not at all.

Over the years, I have repaired or replaced a multitude of firing pins that I would class as being of the Rube Goldberg

variety in all types of sporting handguns and shoulder weapons. In most cases, the owners of said guns had attempted either to shorten or sharpen a factory-fitted and installed firing pin simply because they thought "it wasn't right." The result was that the guns wouldn't fire at all or only on occasion. Some were of the opinion that they had purchased faulty ammunition, ignoring their own errant craftsmanship. The ammunition had to be the cause of the trouble!

Too, there have been many cases where the original firing pin had crystallized and broken, necessitating installation of a replacement. However, due to the lack of a ready source of supply or the fact that the gun owner felt that he could make a firing pin himself, he — as a rule — obtained



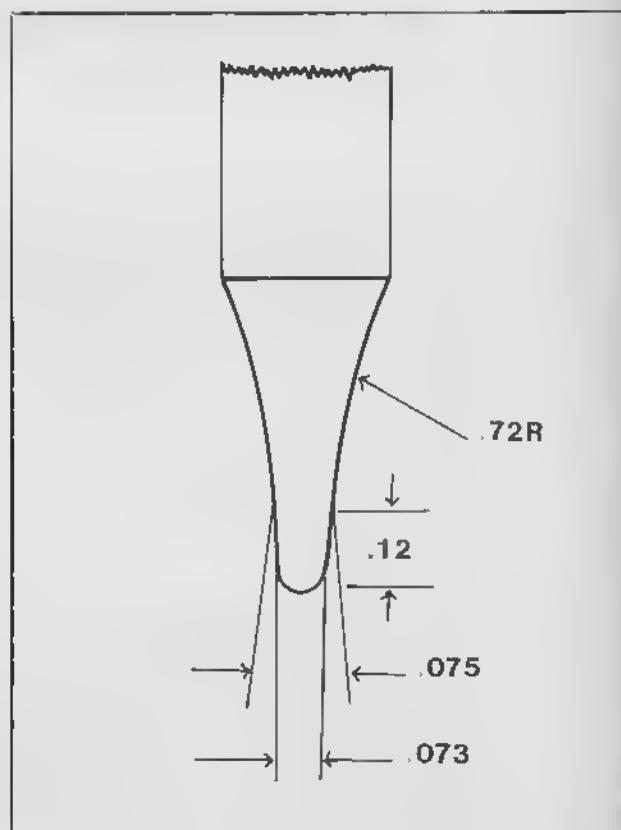
A firing pin — proper in contour, length and polished on the point correctly — should leave a perfect burnished indentation in the primer, as is illustrated in this case. (Right) This is Bish's concept of what he considers the most popularly accepted firing pin point radius for all center-fire cartridges. The drawing is not to exact scale.

a common nail or piece of cold-rolled steel and whittled out the needed part. The end result was that on rare occasions the cobbled-out pin might have lasted for years, but more often the newly made component wasn't capable of firing more than one round before it was pounded out of shape.

Contrary to what some may think, the firing pin of any well-built gun is a highly engineered part. Its overall length, the degree of angle and shape of its nose are all important to the proper and instant detonation of the cartridge primer. The steel from which the firing pin is made and its degree of temper will determine its efficiency. Should it be too short, too long, too dull or too pointed, then troubles are certain to be experienced sooner or later.

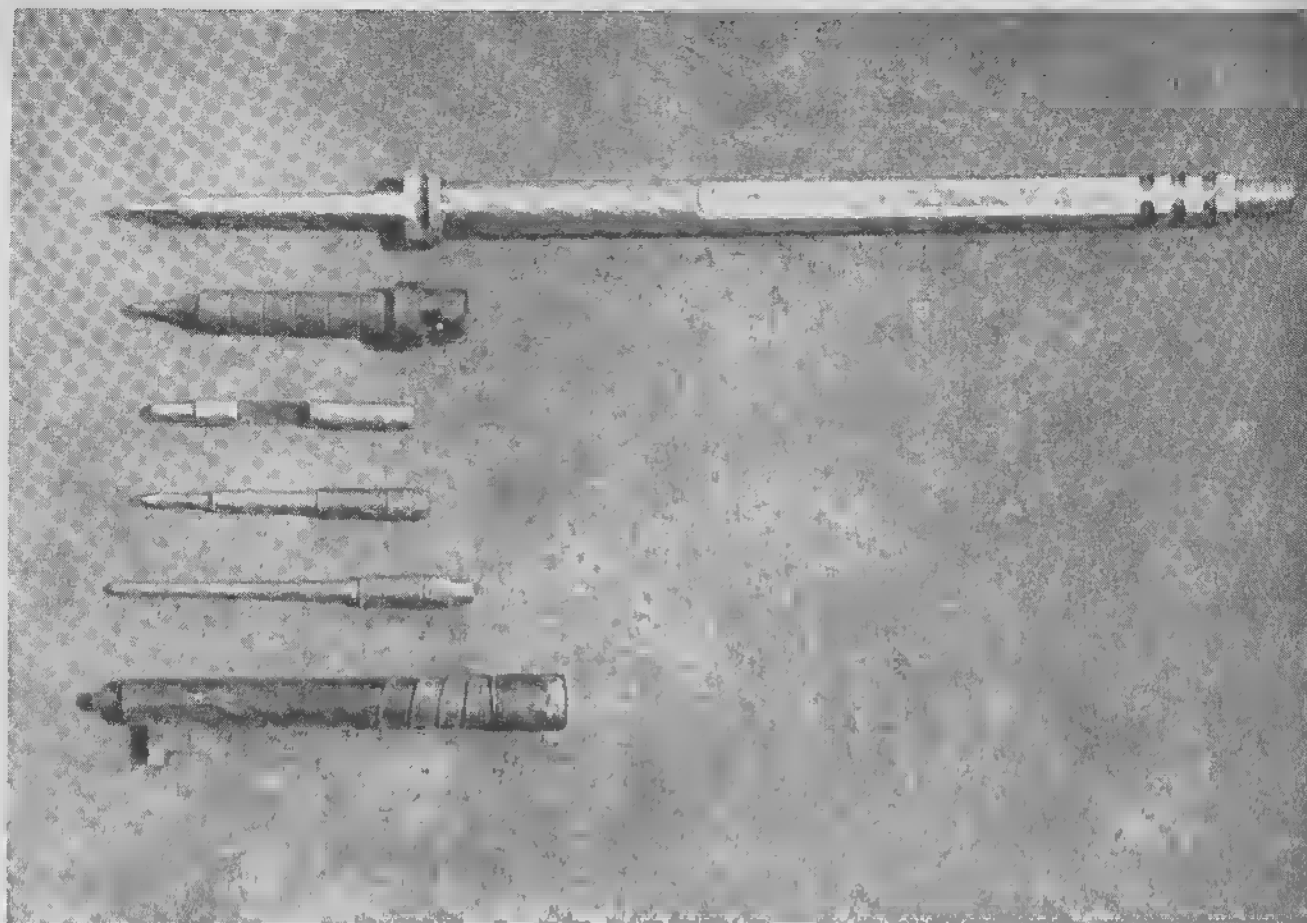
Quite naturally, the radius and profile of a firing pin for a rimfire cartridge differs greatly from that for a center-fire round.

In the center-fire version, there is what is known in the trade as radius-to-caliber, when it comes to forming the nose or point of a firing pin to ensure the proper detonation of the primer. Should this radius be too blunt, misfires will





When he goes into the field for game, Bish has a kit close at hand that will allow him to replace or to make instant repairs to firing pins or other broken gun parts. This practice can save many hunts.



This collection comprises a variety of round and flat firing pins for the .22 rimfire cartridge, as well as those for the big bore center-fire rifles that include the Mauser and the 1903 Springfield. Note design differences.

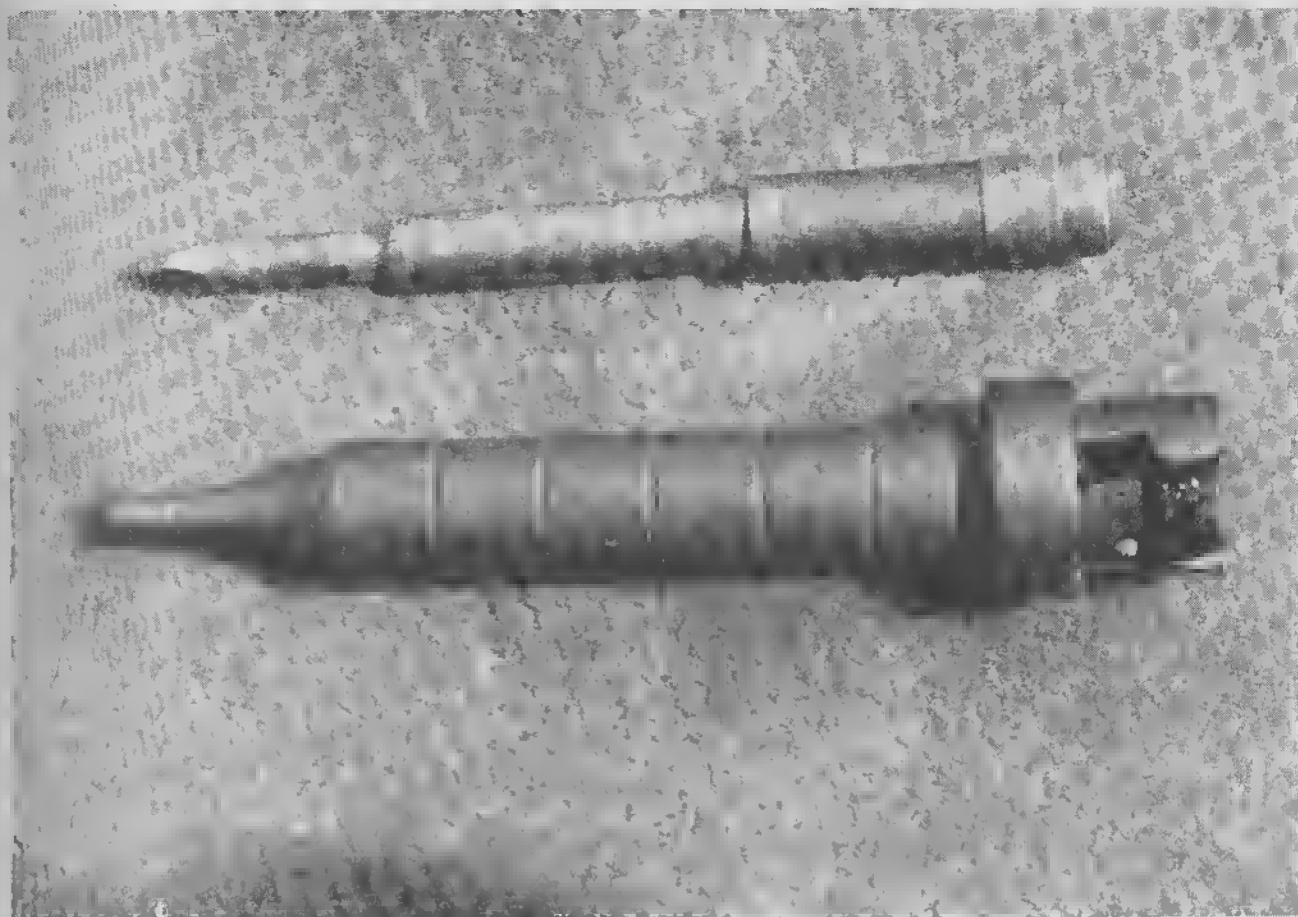
occur. Should it be too sharp, pierced primers and blow-backs often result.

In order to illustrate more clearly the hows of making a new firing pin, assuming that none are immediately available of factory origin and also assuming that you are in possession of the original firing pin parts, broken though they may be, it is best to use these parts as a template for the new pin.

A piece of drill rod (tool steel) of the correct size is lathed or filed to the exact dimensions of the original firing pin, being particularly careful in this phase to assure that both the overall length and taper of point is identical to that of the broken pin. Following the initial shaping, the entire

firing pin then is polished, completely removing any file or tool marks from the surface. This is particularly important in the point or nose section of the new pin.

The new firing pin should leave a burnished appearance in the indentation when it strikes the primer. Lastly, the new pin is heated to a cherry red and quenched in water, re-polished and drawn in temper to a dark blue color. Correctly done, this will leave the new firing pin extremely tough in texture, but not to the point of being brittle. A good rule of thumb to follow in tempering a gun component such as this is: If a file will barely scratch its surface, it's tough enough. However, if you find that a file cuts the new pin easily, retemper; the pin is too soft.



Firing pins tend to be distinctive in shape and design, depending upon their use. The pin at top has a wedge, flattened shape for ignition of a .22 rimfire case. The lower firing pin was designed for center fire Springfield.

In some cases, where firing pin troubles are experienced, even though the firing pin appears to be in perfect condition, there is the possibility that the recoil shield or the hole in the frame of the gun has enlarged itself to the point it no longer supports the radius of the firing pin's nose as it should. Should this be the case, it is necessary for a competent gunsmith either to replace the original worn bushing or drill out and install a complete new bushing in a frame where such a bushing was not original equipment.

Another factor in firing pin malfunction often is experienced where retracting springs are utilized, such as those in many shotguns and automatic pistols. Should these springs be too stiff or possibly break under normal use, firing pin

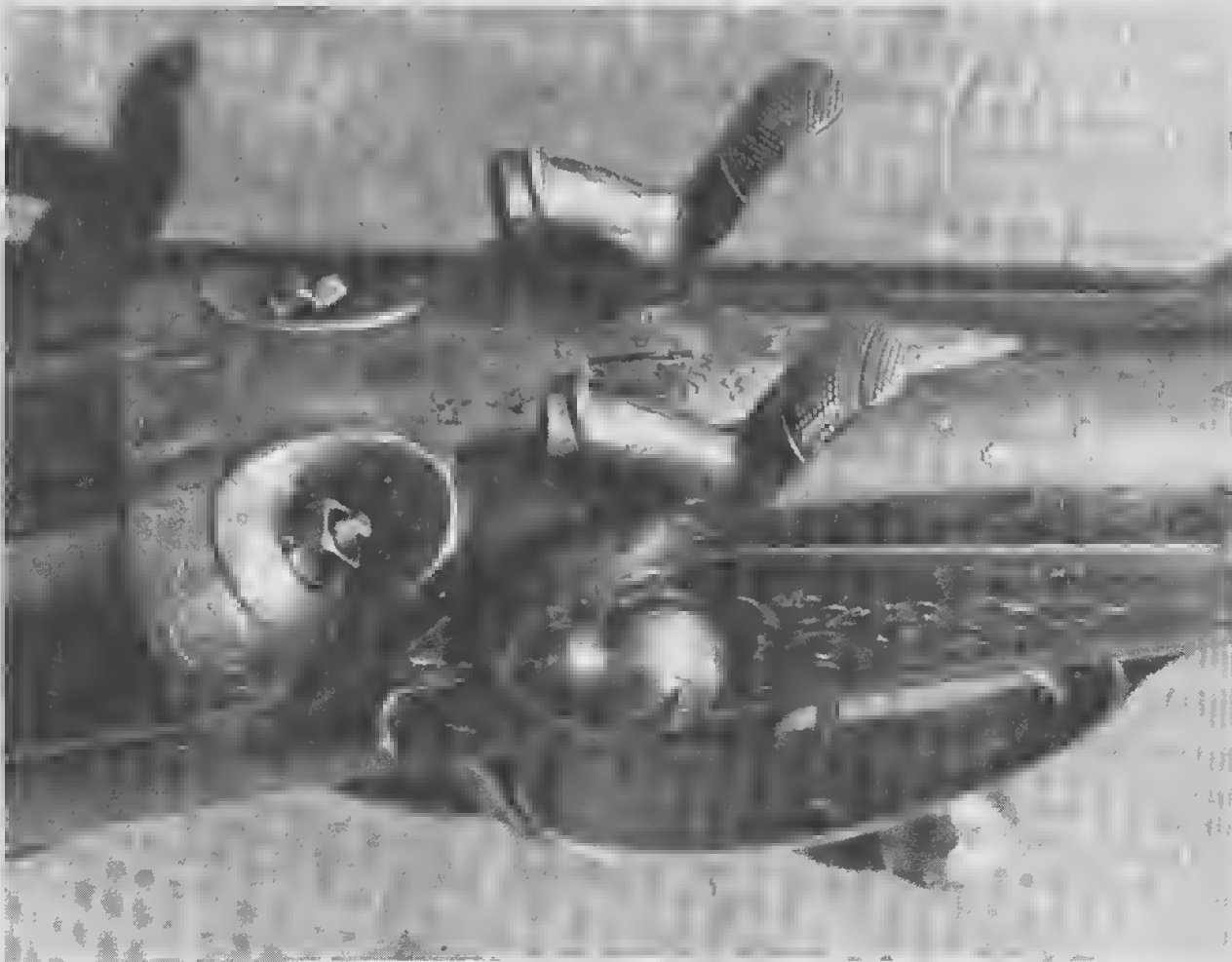
troubles could result. A broken retraction spring can jam a firing pin, often locking it in place in the firing pin bushing, as in a double-barrel shotgun.

In such an event, no attempt should be made to break or open the gun. The locked firing pin protruding from the recoil shield could mar or seriously damage the breech facing of a barrel or set of barrels. Should this occur, it is necessary to dismantle the action, remove the firing pin and broken spring, then replace the spring and reassemble. With those shotguns having exposed hammers, the repair or replacement of firing pins is a simple matter, necessitating only that the firing pin retaining nut be unscrewed to expose the entire spring and pin.



Should a firing pin retraction spring break or become badly malformed, firing pins tend to stay in forward firing position. This could result in the gun being impossible to open in the case of break-action type.

The firing pins of this Purdey double rifle had tendency to stick in the forward position. After investigation, this problem was remedied by the author, who removed the firing pins to successfully replace retracting springs.



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Contrary to what seems popular belief, not all firing pins for rimfire cartridge ignition are flat or wedge-shaped. For example, in the old High Standard pistol, pins are round.

In the case of some automatic pistols there is what is known as a free-floating pin that is actuated by a sharp blow from the hammer; this gives it sufficient momentum to travel forward in its slot with sufficient force to detonate the primer. Firing pins of this type are shorter than the channel in which they ride. The firing pin, after striking the primer, is drawn to the rear by the retraction spring until the nose or point of the firing pin is flush with the face of the breech block or slide. Should this retraction or firing pin spring be broken or be too stiff, then firing pin troubles are certain to happen.

Replacement firing pins for rimfire cartridges are made in basically the same manner as that outlined for center-fire cartridges. They must be made from good tool steel and properly tempered. However, the major difference in the two types of firing pins will be found in the shaping of the point or nose of the pin.

As outlined, the nose of a firing pin for center-fire cartridges must be rounded to the proper radius. The point or nose of a rimfire firing pin must be either wedge-shaped or, in the case of some pistols, revolvers and rifles, the pin is round in shape, but has an almost flat nose to assure proper detonation of the fulminate within the rim of the cartridge.

The wedge-shaped version is not sharpened but is left with a slightly rounded, flat surface to assure that the firing pin does not pierce the brass rimfire cartridge case. This

flattened surface should measure approximately one-sixteenth-inch in thickness or slightly less. Too, the exact proper length is all important for reliable primer detonation, whether rimfire or center-fire.

Though the lowly firing pin is seldom mentioned in writings concerning new or even obsolete weapons, it still is one component that has sent many a hunter and shooter home without the satisfaction of a trophy bag or a decent score on the target range.

In many cases the malfunctioning of a firing pin can be remedied easily in the field had the sportsman thought to include an extra in his kit. This is especially true of customized sporting rifles based on the '98 Mauser, Springfield, Enfield or any of the other so-called war-weary and obsolete military arms that have been converted to sporting use. The replacement of a firing pin or extractor is a simple matter, if the sportsman will use forethought in planning his hunt and include these vital parts in his field repair kit.

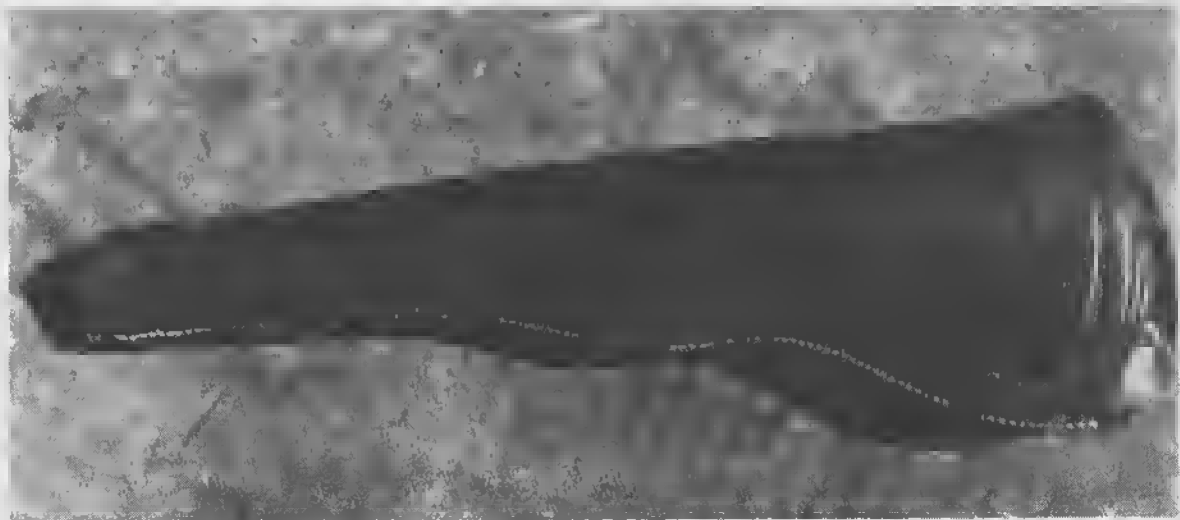
However, it has been my experience that too few hunters take into consideration those factors that could happen to even their most cherished hunting arms. A rifle, pistol or shotgun is only a mechanical device. It is subject to wear and tear and failure of parts just as the automobile. Therefore, especially on an extended hunt into a wilderness area, some thought should be given to those parts most liable to breakage — especially firing pins and extractors.



Chapter 21

LATHER YOUR LEATHER

*You Can Form-Fit Your Holsters And Sheaths For
Comfort, Cleaning Them At The Same Time*



Old and valuable pistol holsters can be rejuvenated by the methods outlined in this chapter. This rare, old holster for Colt Navy percussion is more rare than the gun that it fits and deserves full preservation.

IN POSSIBLY eight out of ten cases, individuals are using leather goods, such as holsters, rifle scabbards and knife sheaths that are ill-fitting for the gun, the knife and/or for the person himself.

Take, for instance, the man who cries his eyes out when he notices that his latest pistol, revolver or rifle suddenly has come down with blue-wearitis. Although the gun was carried in a new holster he had purchased, the malady is there. The gun is getting pale around the muzzle. The

beautiful blue is wearing slowly to a grayish metallic appearance!

For the most part, leather goods purchased from the better known makers are almost devoid of that tight fit which spells nothing but blue wear on a fine firearm. Some makers have worked out a system whereby each holster is formed to the exact shape under hydraulic pressure. Following this, while the leather is still damp, each holster is rubbed by hand to assure a perfect, friction-free fit. However, this



Prior to insertion in wet holster, the gun first should be coated with a light gun oil, then wrapped in a tough but thin plastic sheeting.



Leather is allowed to soak until it takes on an evenly darkened color. Then holster is ready for forming.



narrative is not for those who buy only the finest in moulded and fitted leather goods. It is for those who might own older or ill-fitting leather that they want to improve through a minimum of elbow grease and little or no cash outlay.

Most blue wear of fine firearms is due to ignorance of the qualities of leather and to what extent they might be worked. For those not familiar with the types used in gun holsters and belts, such leathers are known by numerous names such as California skirting leather, chrome-tanned and others. For the most part, the better holsters are made of skirting leathers containing a minimum of the wax or tallow found in many English saddle leathers; the best leathers are known as rolled shoulders. This denotes the part of the beef from which the leather is obtained and, rolled means that it has been rolled with heavy steel rollers to improve the texture and durability.

Over the years, I have found that California rolled shoulders stand up better under hard use than any other type of leather I have used. It will stand repeated soakings from rain, sleet or snow or from submersion in a river or mountain stream. Despite all of this, if the leather is allowed to

Above: All surfaces are boned down where tightness or friction may be encountered, moulding the leather to the contour of the gun. (Right) Rifle scabbards can be moulded to exacting fit in the same manner outlined in text for a holster.





Readily available to most is Kiwi's Mink Oil leather preservative and waterproofer. Author has experienced excellent results with it, especially in snow and rain, with the leather left unaffected by repeated soakings.

dry naturally in the prevailing temperature, it will return to its original toughness.

Never place any leather near artificial heat, such as a stove or heater, to dry it out. This will deteriorate the leather more quickly than any other means.

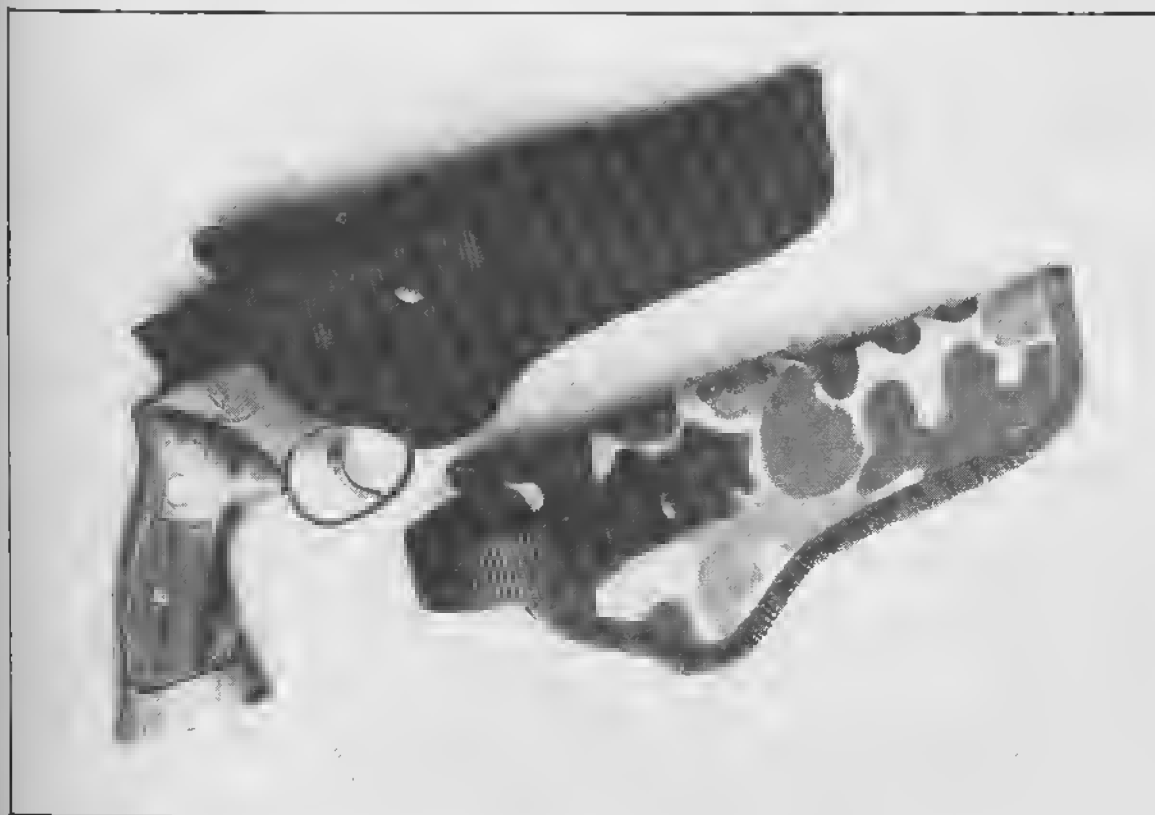
Remember that if it is good saddle-type leather, water isn't going to hurt it, provided the water is cool. Good saddle leather can be shaped and moulded to any configuration desired, once it has been soaked a prescribed time in cool water. It then is allowed to dry naturally on the form to

which it is shaped. Once dry, the leather will retain this shape indefinitely. Following the shaping and drying, the leather is given a thorough coating of a glycerine-based saddle soap, allowed to dry once more, then is coated with a dressing.

I have always had a problem in wearing a new carved leather belt. As a rule these belts are of a style worn almost solely in the West and measure about 1½ inches in width. When new, belts of this type have a nasty habit of not hugging the hips as they should, resulting in the hard edges of



Requiring virtually nothing in the way of care, Cordura holsters designed for both revolvers and automatic handguns are produced by Michaels of Oregon. They do not cause any wear on bluing.



the belt sometimes sawing away at the tops of my hip bones. The remedy I found for this some years ago was to soak the belt in water, then place it, still damp, around my waist the moment I was through carving it, then wear it until perfectly dry. The result is a perfect, hip-hugging fit!

For fitting gun belts and holsters, pour a small amount of cool water in a container large enough to hold them. Allow them to soak until the leather is well darkened. This shouldn't take much over five minutes, depending on the thickness of the leather. The pistol or revolver then is oiled well and placed in a thin plastic bag such as the type in which your laundry returns your shirts. The bag is wrapped tightly around the entire gun, then the gun is pushed snugly into the holster.

With the plastic-wrapped gun inserted all the way into the holster, the next step is to use a hard, smooth object,

such as a toothbrush handle or a short section of smooth ivory to rub the entire surface of the leather. Take particular pains with those areas covering the cylinder and frame and the muzzle of the barrel. This is where most blue wear occurs. Continue to rub in this manner, until the leather begins to return to its natural color, denoting that it is beginning to dry out. Then set the unit aside until it is completely dry. The plastic-covered gun may be removed from the holster, the bag removed from the gun. The gun now should slide in and out of the holster with no tight rubbing as before.

Should the leather be quite old and rather dried out, it is best to saturate the surfaces thoroughly with glycerine saddle soap instead of water before rubbing. Not only does this tend to relubricate the leather, but gives the leather new life.

Contrary to popular belief, the use of neat's-foot oil on

The leather of this holster has been soaked until it has become pliable; this is done before gun is snugged into it.

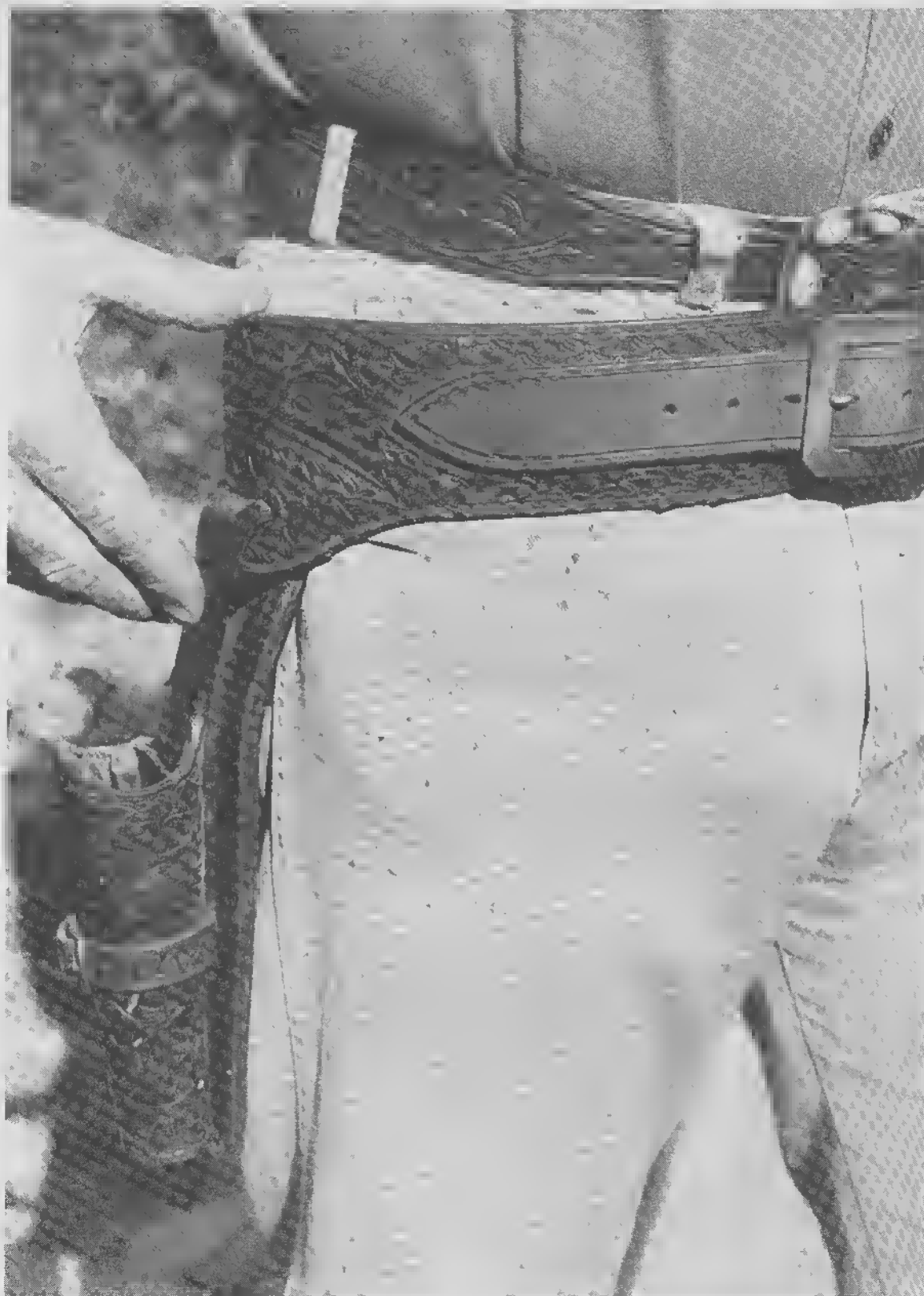




Knife sheaths can be moulded to the blade of the knife; wet the leather before the blade is inserted. Then rub the sheath as outlined, using a hard, smooth object.



Even ornate holsters such as this highly carved style can be given the treatment described here, but care should be taken not to scratch leather when it is still wet and surface rather soft.



Pistol or revolver belts are buckled around the waist while still damp, then are moulded to contour of the individual.

old leather is strictly taboo, unless you want your older holster, belt or any other leather goods with any age to fall to pieces! Neat's-foot oil should and must be limited to new leather and, even then, to one thorough coating. After this, the leather should receive only an occasional lubrication with mild saddle soap, preferably with those with a glycerine base.

Incidentally, an excellent leather preservative and water-proofer is one readily available to most. Known as **Kiwi Mink Oil**, this treatment contains everything necessary for good leather care including silicone.

Most new gun belts have a nasty habit of not fitting the hips as they should, as happened with the waist belt described earlier. After soaking, remove the gun belt from the water and wipe all excess water from the surface. Strap it around your waist and begin moulding it to your body by rubbing it with your hands. If it has a habit of riding your hip uncomfortably, allowing the top edges of the leather to stick out away from your hip, mould it with your hands until it lies snugly in place. Once the belt is perfectly shaped to your own conformation, allow it to dry. This shouldn't take much over a half-hour or so and, when dry, you will find that the belt fits as though moulded to your waist, which it was!

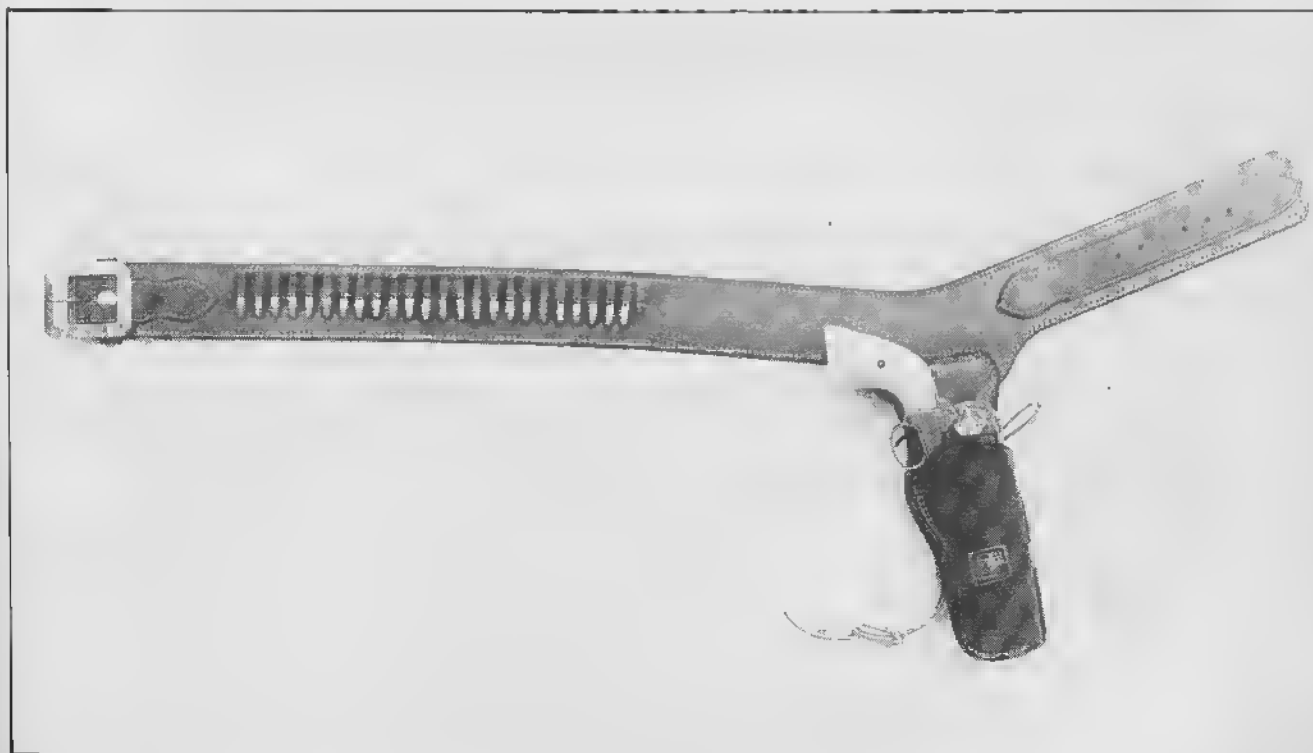
Saddle and skirting leather is one of the most versatile of all materials. It may be moulded to any shape desired and will retain that shape indefinitely. When well cared for, it will easily last through generations of the hardest use. Neglect it and it will go to pieces in a few years!

The same basic method described refers to any leather used by sportsmen, hunters or horsemen. Leather is leather and, regardless of who uses it, it all requires the same identical treatment for either shaping or moulding to fit a specific purpose or to prolong its life.

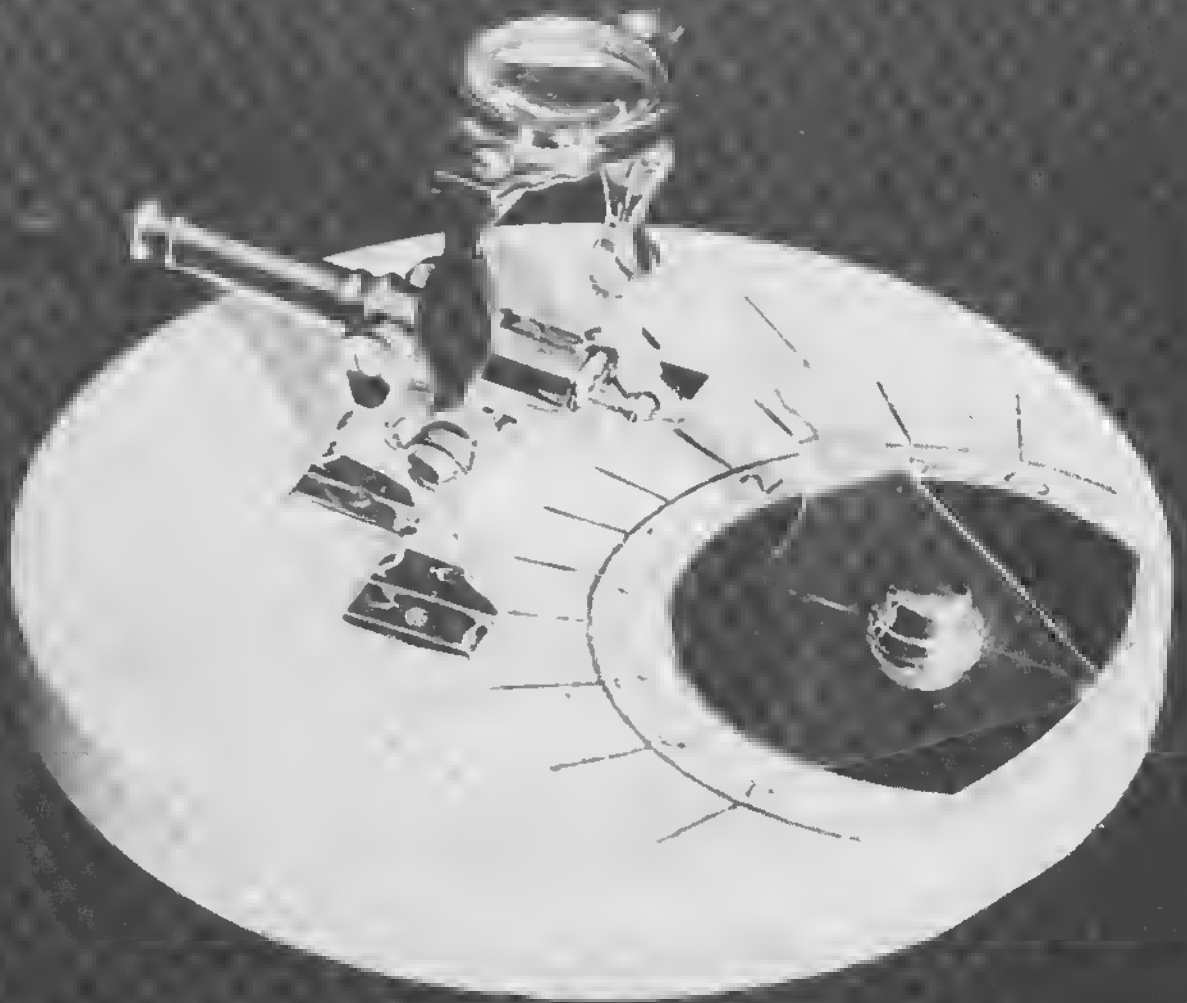
On the other side of the coin, Michaels of Oregon has recently introduced an all-new breed of gun holster. It requires no form-fitting, will not mildew, dry out, crack nor require special care.

These holsters come in ten sizes, are constructed of a tough Cordura nylon and lined to prevent blue wear on fine pistols or revolvers. What I like about them is that they are American-made of American materials. Made for either right- or left-handed shooters, they are available in either camouflage or black. Holster belts of the same material and colors are also available. So, if you are the lazy type and don't care to baby your leather holsters, then these no-care holsters may be for you.

Once the gunbelt and holster have been moulded as the author has outlined, it should retain its original finish after it has been dried properly. However, it should be allowed to dry in shaded area, away from a heat source.



Chapter 22



TIME FOR A CANNON

This Reproduction Of A Shooting Sun Dial Is Easily Built and Makes A Great Conversation Piece!

ONE OF THE most interesting, unusual, unique and rare of all medieval black powder firing devices is the little-known black powder shooting sun dial cannon.

It has been suggested that Galileo, the Italian astronomer and physicist (1564-1642), designed and built the first of these little time pieces sometime early in the Seventeenth Century.

But regardless of origin, today only a few of the originals of these black powder firing "alarm clocks" of brass and

marble have survived the centuries. It is doubtful that one advanced arms collector in 10,000 has even seen one of the originals!

The purpose of the sun dial cannon was to fire a small charge of black powder by means of sun rays being directed through a small glass prism mounted directly over the touch hole in the cannon's breech. The exact purpose for which it was designed is unknown. However, through actual tests, I learned that this little gadget does work; the result of a little experimentation in placing the mounted

Left: The black powder sun dial cannon completed. (Right) Parts for the kit, when received from the maker, require assembly and finishing before the device is in fully ready to fire state.





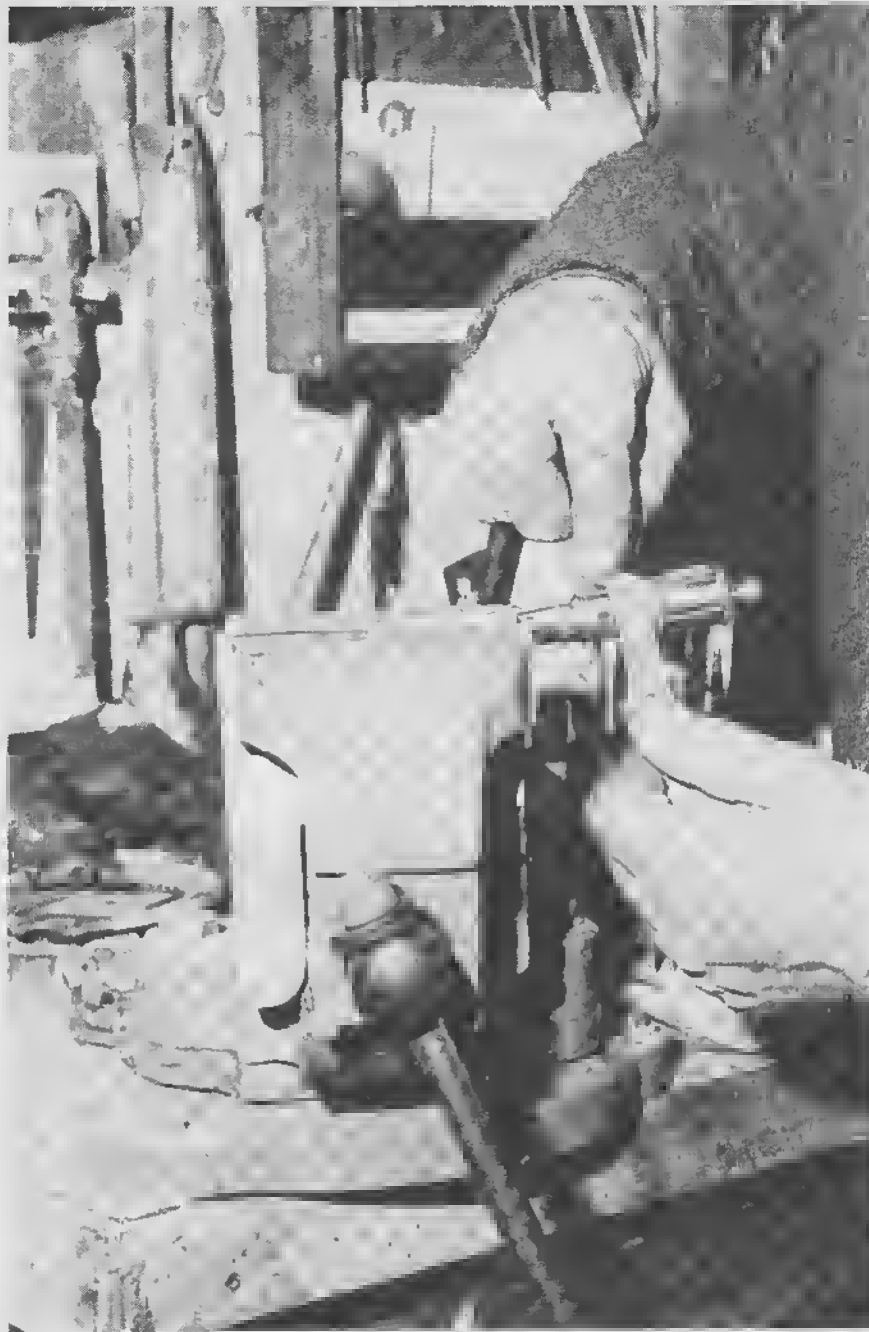
The mounting brackets were smoothed by hand, using files and emery cloth, taking great care to retain all of the original contours of the metal.

prism in exactly the correct position to catch the noon rays of the sun.

The sun's rays, concentrated through the prism, move slowly across the area of the dial until directed onto the priming charge. This black powder is held in a trough at the cannon's breech. The intense heat created by this pinpoint of sunlight ignites the priming powder and the little cannon erupts with a sharp explosion! In firing, the glass

prism becomes thoroughly smoked up, necessitating that it be cleaned after each firing.

A modern version of Galileo's sun dial cannon has been placed on the market as a finish-it-yourself kit by the Dixie Gun Works of Union City, Tennessee. Due to the popularity of these kits and low production by the manufacturer, they are usually in short supply at Dixie Gun Works. As a result, there may be some delay in delivery. I would



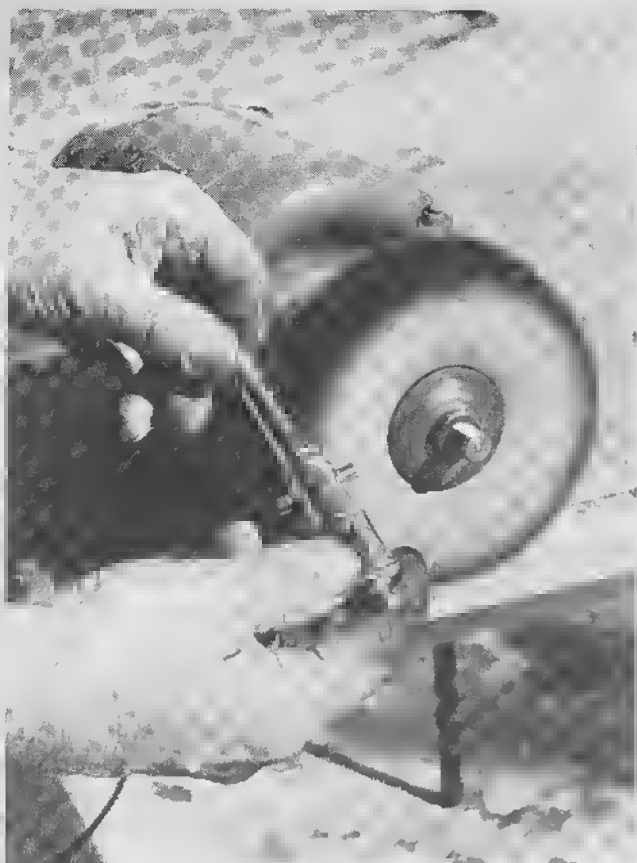
Detailing the miniature cannon barrel also is accomplished with files and final finishing with emery cloth strips. The castings were quite rough.

suggest that the prospective builder write Dixie concerning availability.

As received, the sun dial cannon consists of nine separate brass castings which must be smoothed and polished. These parts consist of the cannon barrel, its two mounting bases, the adjustable bases, arms and prism ring and the base to accept the precut gnomon of sheet brass. Also included in the kit is a circular marble-like base measuring

almost ten inches in diameter. This base is predrilled to accept the five assembly screws which hold the finished brass components. It is marked off in one-hour settings on its face. All screw holes are predrilled and threaded in the brass castings.

While all components of this kit are furnished in a somewhat rough, sand-cast finish, it is possible to smooth and give each part a high polish in a couple of hours. This is

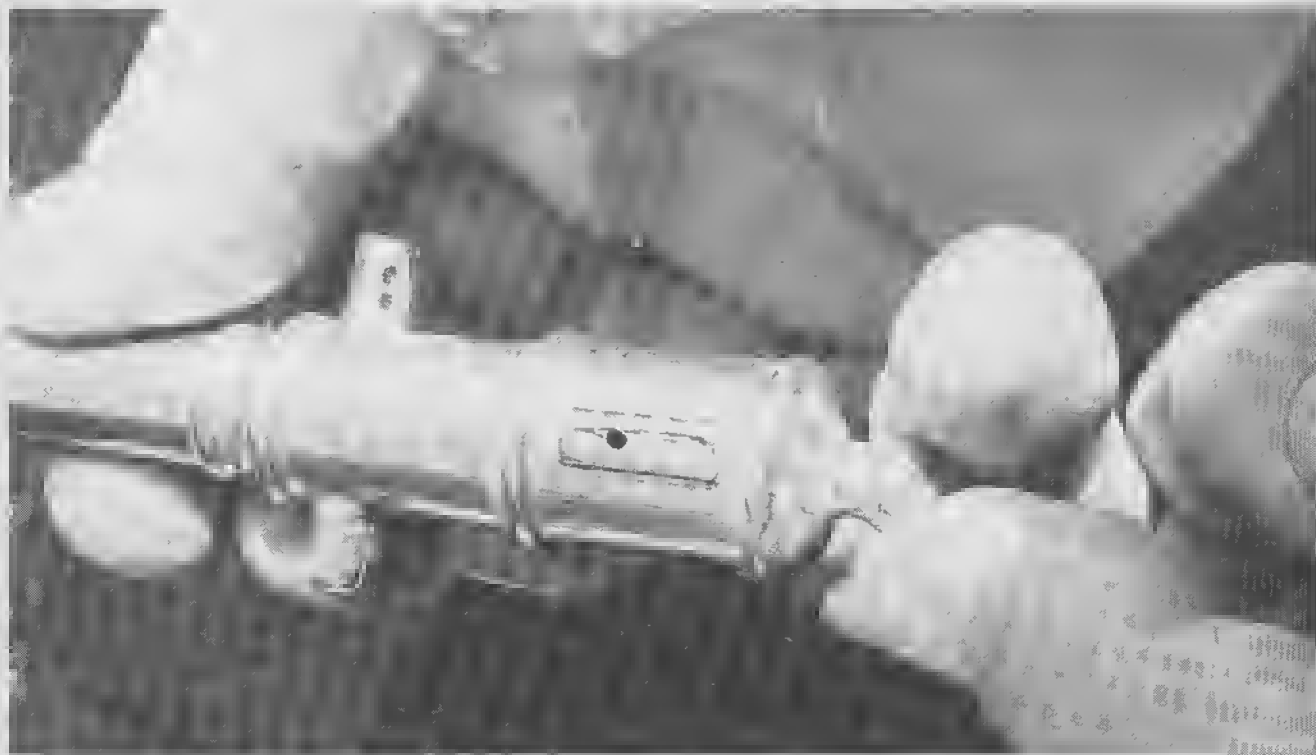


Buffing is another step in finishing. Care is taken to retain the contours.



Small parts such as mounting bracket must be buffed to remove all scratches.

The powder trough that is cast into the cannon's barrel to surround the touch hole should be finished by hand.





The gnomon and its base may be soft-soldered together, although base is cut for a slide fit.

accomplished by first dressing each component to reasonable smoothness with files, emery cloth and a disc sander. With the exterior roughness removed, each part then may be thoroughly buffed to a high polish. The first phase of buffing should be done on a muslin wheel using black emery buffing compound to remove completely any objectionable scratches. The final buffing should be done with a muslin wheel dressed with a white buffing compound that will give it a mirror-like finish.

As will be noted, all bases and legs supporting the cannon barrel and prism mounting have a definite contour and shape to them. These conformations should be retained in

the finished product if an attractive and worthwhile item is to be the end result.

It is best to finish one of these brass castings at a time; file, sand and polish it to a high luster, then go on to the next. The cannon barrel itself should receive special care and attention during the polishing stages. One could ruin the entire kit should this one component be loused up during the all-important polishing phase.

In finishing my own version of the sun dial cannon, I found that the best procedure was first to detail each component with a variety of metal files, then progress to a fine-grit emery cloth. The flat surfaces of all components may

be smoothed quickly by running each across the face of a disc sander equipped with a fine-grit sanding disc. Following this, each part was buffed thoroughly as previously outlined.

A certain amount of fitting will be required to assure that each of the components sits squarely on the marble base. This applies principally to the cannon mounts and the prism bases. The rounded, contoured base holding the gnomon of sheet brass may require some work to assure

that the gnomon sits perfectly perpendicular to the base.

The detailing of the cannon barrel should be undertaken with a certain amount of precision, especially at the breech where is located the elongated priming powder trough. This powder trough is all important in the proper functioning of the finished sun dial. It measures about a half-inch in length, the bottom is perforated with the touch hole. In actual use, this trough is primed for its full length with 4F black powder, thus compensating to some extent for any

Five mounting screws are included with the kit. These are used to secure the finished components to the marble base.





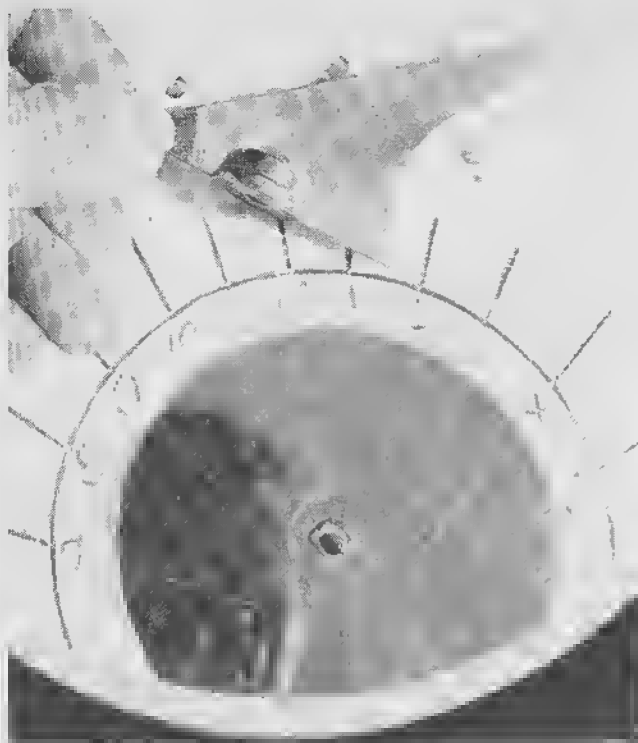
The parts of the prism base are assembled after they are polished. Mount must fit squarely to function.

variation in the sun's rays entering the prism. Regardless of where the small bead of magnified sunlight hits the powder primer in this trough, it is certain to ignite the black powder, thus firing the cannon.

The base of synthetic marble will require no work by the builder. The necessary holes for attaching the brass com-

ponents are predrilled, as stated. With the face of the base marked off in one-hour settings, one can give these markings more prominence by tracing each with a small camel hair brush dipped in either black paint or enamel, thus adding more definition to the dial face. Too, as a little extra addition to the appearance of the finished article, I formed





Left: Barrel mountings are fitted precisely to cannon's trunnions prior to final polish and assembly. One mount has a locking screw to hold barrel at a proper angle. (Above) Hour markings on marble base can be darkened with black paint or enamel. Brass plate with scribed markings was not included with kit; author added touch.

a brass plate, placing it under the gnomon, scribing the hour lines onto its surface. Correctly done, this addition to the basic kit adds greater eye appeal to the finished product.

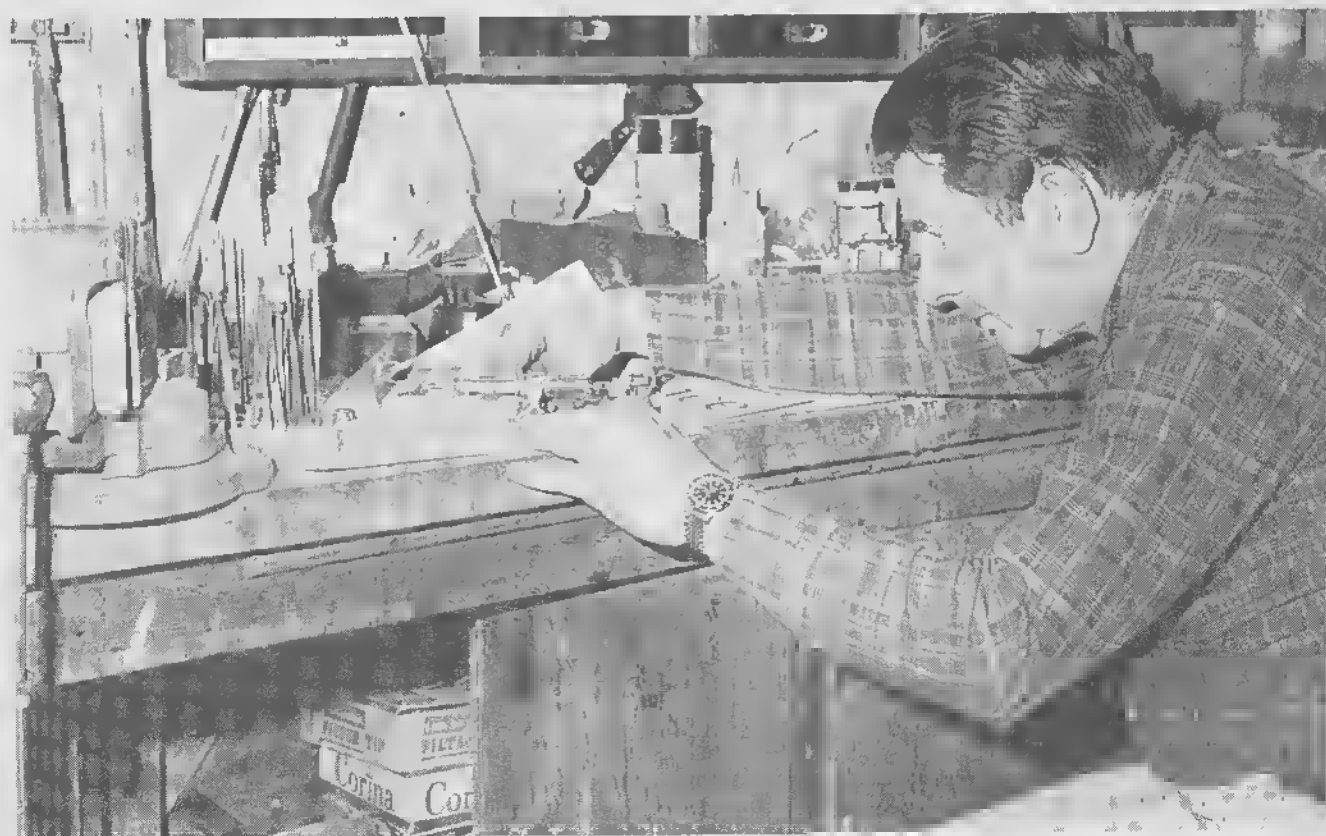
When all brass parts are smoothed and highly polished, they are mounted in their respective positions on the marble base. The last to be screwed in place will be the prism mountings. When securely in place on the marble base, the precision-ground prism is inserted into the mortise in the mount and either epoxied in place or it may be held with a stiff, circular ring cut from a section of thin fiberboard or similar material, making it easy to remove for cleaning.

While the sun dial cannon may be placed on a permanent pedestal of some sort in the backyard or patio when completed, it must be calibrated carefully to the noon rays of the sun to correctly fulfill its intended function. This is accomplished by a little experimentation and adjustment to the angle of the prism in relation to the direction of the sun's rays. However, when I completed my personal version of this little oddity, it found a place in the living room of my home.

While the little cannon is completely functional, it was too unusual and attractive to subject to the vagaries of nature. I have plated mine with silver, using the plating kit as produced by the Texas Platers Supply of Dallas, Texas.

While silver plating adds a touch of elegance to the finished sun dial cannon, it renders it unsuitable to exposure to the elements due to the silver oxidization that will blacken the metal.

Bish makes the final adjustments in the cannon assembly before he secures the finished unit to sun dial plate.



HOME FOR A BLADE



A Custom-Made Sheath Gives Your Knife The Care And Respect It Deserves



Left: The front panel of the sheath is cut from leather, allowing space around the blade to accept the welt and the stitching. (Right) Back panel is traced with front panel as pattern, then it is cut to form back and the belt loop.

MANY SHEATHS furnished with some commercially built hunting and sportsman-type knives are for the birds! The reasons for this skepticism on my part were arrived at after close examination of countless sheaths, the majority of which were constructed of inferior materials. The all-important stitching was done with cheap, flimsy cotton thread and the material used in the sheath itself was akin only to Tijuana leather!

Despite that comment, not all commercial knife sheaths are constructed of poor materials. Some are quite good. As a rule, the bad ones are constructed of a leather-like material — possibly reclaimed, compressed leather fibers — that is too flimsy and too thin. The stitching makes the sheath unworthy and downright unsafe for carrying a sharp hunting-type knife. Should the wearer take a tumble down

a mountainside, the sharp blade could slice through this thin material and cause severe injury. It has happened.

Admittedly, I'm hard to please when it comes to leather. I want that sheath to be of genuine leather, tough and thick enough to withstand years of use and even unintentional abuse.

I built my first knife sheath over a third of a century ago and have been building my own since. Should this one piece of equipment fail me, I have no one to cuss but myself!

Construction of a durable, safe knife sheath involves more than cutting and sewing a couple of pieces of leather together, cutting a couple of slits in the back panel to serve as a belt loop, then letting it go at that. A really good knife sheath is built only after several hours of painstaking, careful workmanship and a little common, ordinary horse sense,



The end of the belt loop section of the leather is skived — or cut on a taper.



The skived section of belt loop then is coated with a good flexible leather cement. The author recommends type made by Barge.



When cement becomes tacky, the skived section of the belt loop is folded with the smooth side out, then it is pressed into place on designated sheath section.



A small leather block is cut and skived to form counter on which knife guard will rest. The block is coated with cement: it then is pressed into place and is left to dry.

although variations in design certainly are the privilege of the individual maker.

Long ago, I found that the best, most durable leather for building such accessories as a holster, gunbelt or knife sheath is that which is known in the leather trade as rolled shoulders. This leather, the toughest part of the beef hide, is tanned carefully into what is known as California leather. It then is rolled with steel rollers under several tons of pressure. This gives it a toughness that will withstand years of hard use and repeated soakings in water. While this leather is available in several weights, the best to use for our purpose will be in either eight- or nine-ounce weights.

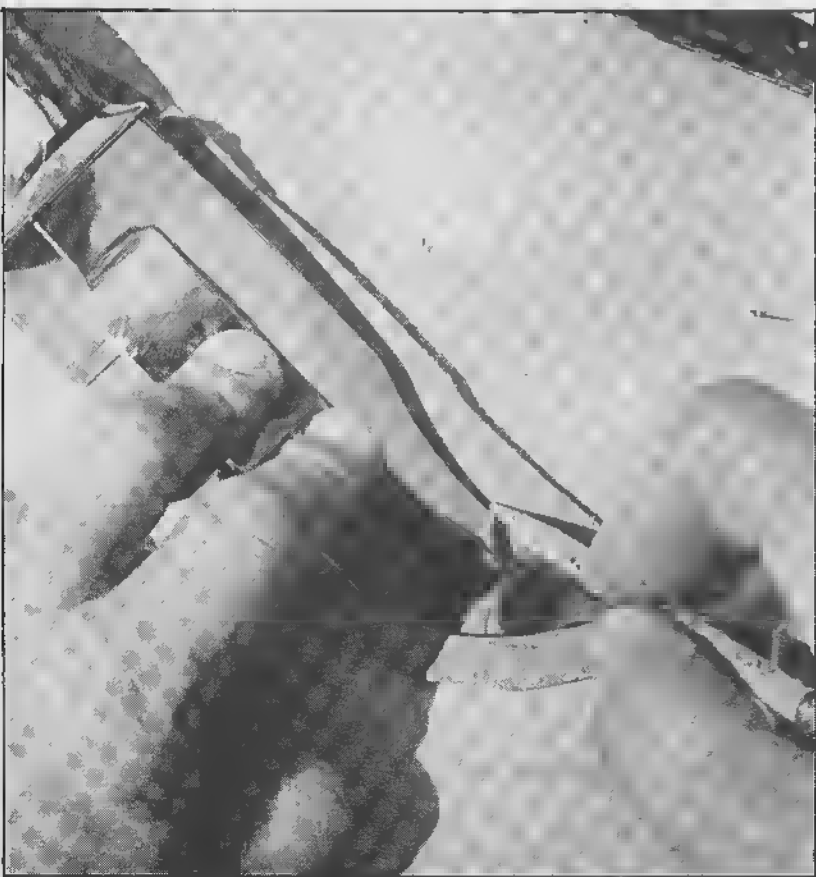
This means that the tanned leather will weigh eight or nine ounces per square foot. The quantity of leather needed for a sheath for a specific knife will depend upon the size and length of the blade.

One important feature in building a knife sheath is to attain a perfect blade fit. Therefore, the blade of the knife for which the sheath is intended must be used as a pattern in laying out the front and back panels of the sheath proper.

The back panel will consist of the sheath pocket to accept the blade and the belt loop. This section is drawn carefully onto the surface of the leather with a soft lead



With belt loop and counter cemented in place next step is to cut and install the welts and front panel of the sheath.



Held snugly against the counter, the blade then is traced onto the sheath section with a soft-lead pencil.



Strips of leather are cut to form the welts. These are cemented, using penciled outline of blade as the guide.



Both welts are cemented to the sheath, taking care that the blade of the knife will have ample clearance.

Starting at the center of the sheath, the welts must be skived in a uniform taper to compensate for blade taper.

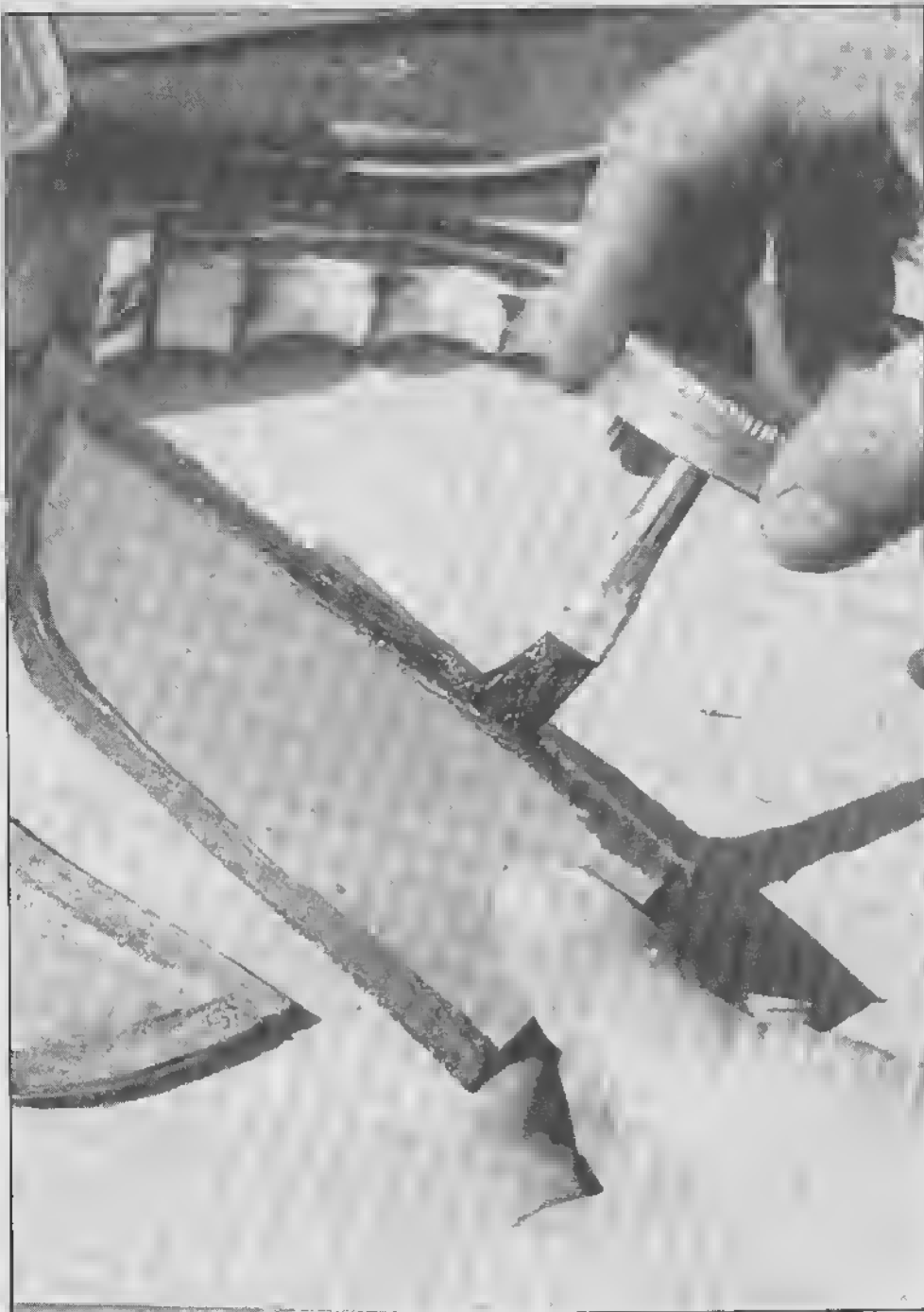


pencil, the blade outline being traced on the lower portion of the leather, with the proposed belt loop extending above.

The entire back panel and belt loop are cut out, using a sharp pocketknife. Make sure that the belt loop is twice its needed length, plus about one inch, on the finished sheath. Once cut out, the belt loop is dampened with water and folded to the front with the smooth side of the leather out. The additional one inch of leather is then skived to a sharp wedge shape, coated with leather cement — preferably Barges — allowed to set a few minutes, then is pressed into its position on the back panel.

During the blade-tracing operation, allow an extra half-inch of leather to extend out beyond the blade on each side. This area will accept the stitching later. The front panel then is traced, using the knife blade as a pattern and adding that all-important extra half-inch or so for stitching area. Then it is cut out as was the back panel.

At this point we have the front and back panel cut out, the belt loop skived, dampened and folded and cemented in place. The next step is to cut a small wedge-shaped piece of leather to be installed on the section of the belt loop just cemented. This wedge of leather will serve as a counter on which the guard of the knife will seat when the sheath is finished. Determine the exact location for placement of this wedge by holding the hunting knife in place on the back panel. This wedge should fit snugly against the guard on the underside.



The front panel of the knife sheath then is given a coating of a good leather cement in the area that will be in contact with the welts in sheath.

The next two pieces of leather cut and installed are known as the welt. They compensate for the thickness of the knife blade, allowing the sheath to retain an attractive contour and, at the same time, the blade will slide effortlessly in and out of the sheath. These leather strips may be cut from scrap leather to a width of approximately one-half inch, then cemented in place, using the previously traced

outline of the blade as guidelines. Firmly cemented in place on the back panel, the welt then is skived, starting at about the center of the sheath and tapering the cut out to the point. This rids the sheath of excess leather in the area where the blade thins down, resulting in a smooth-fitting sheath.

The welts in place and skived, the knife blade is slid back



The front of the sheath then is pressed into place on the back panel. The sheath is taking shape.

and forth into and out of the sheath channel. Should any obstructing section of leather be apparent in the welt, trim these away with a sharp knife until the blade slides freely.

The top, exposed surfaces of the welts are given a thorough coating of leather cement. The same is applied to the area of the front panel contacting the welts, when pressed into place. Allow the cement to dry until tacky, then press

the front panel firmly in place onto the welts. Make certain at this point that the front panel sits in exact alignment with the contour of the back panel. Once in place, lightly pound all cemented areas with a hammer to assure a positive bond of all cemented components.

Incidentally, should one desire to stamp or carve the front panel, this should be done prior to cementing the front

panel to the sheath proper.

The sheath assembled, all that remains is to hand-sew the entire perimeter of the blade area. For this, it is best to use four-cord linen saddlemaker's thread. A length of this is cut to about three feet in length, then drawn through a piece of beeswax. This length of thread will complete about one-half the length around a standard knife sheath designed for a six-inch blade; a new section of thread is brought into use to finish the job.

The saddlemaker's stitch is simple, involving the use of two needles. Also needed is a saddlemaker's awl, a gouge compass for marking the stitch area and an edger for trim-

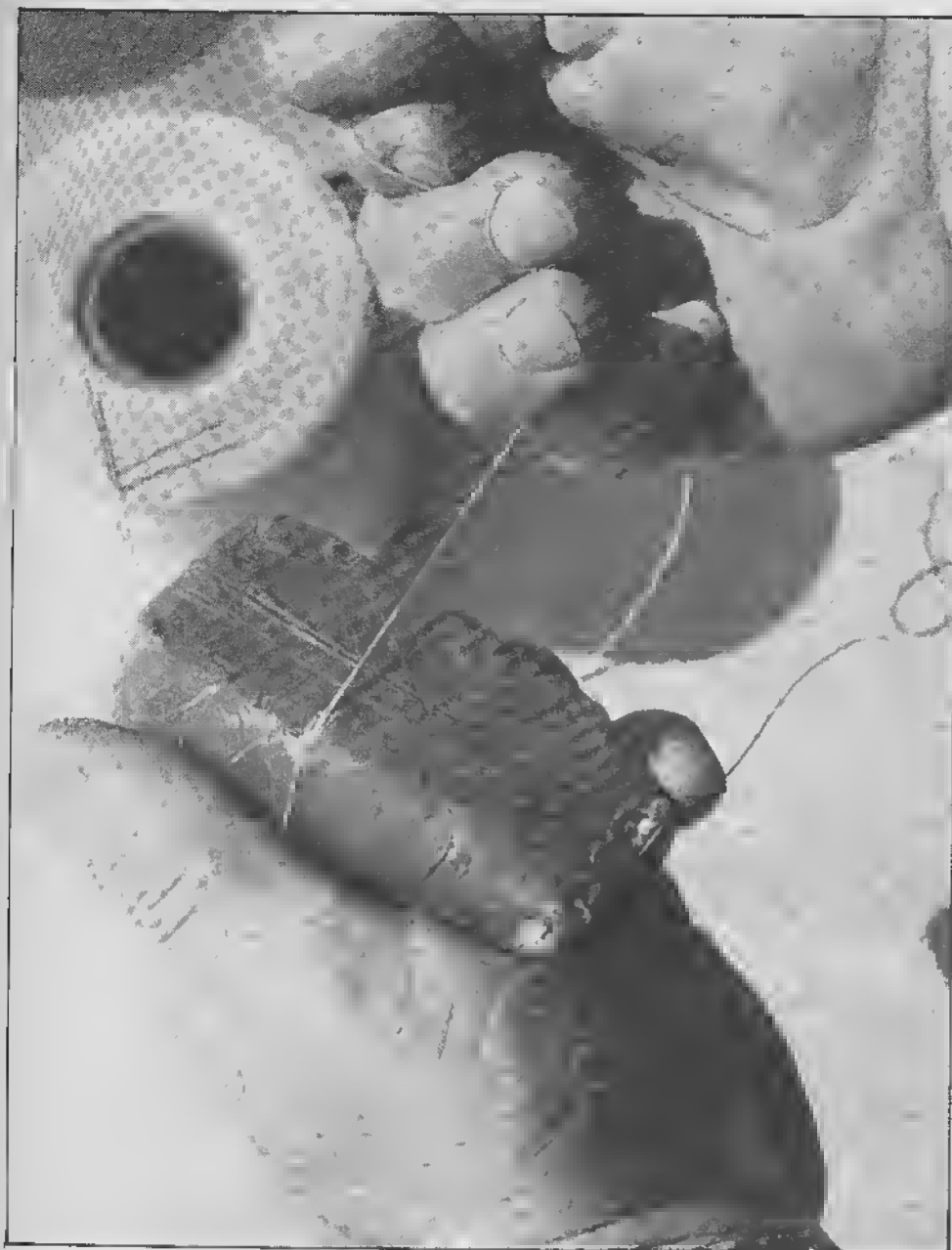
ming and rounding over all the sharp edges of leather once the stitching is completed.

While most home workshops are not equipped with an assortment of leather-working tools, most can be improvised in a few minutes.

Take, for instance, the correct spacing for the holes through which the stitches will be sewn. While there is a leather-working tool known as a stitching spacer wheel, this is not necessary, if one has reasonably good eyesight. The stitching holes are punched with the awl about three-sixteenths-inch apart. These holes must be perfectly perpendicular to assure that the visible stitching on the back of

A stitching groove is cut around the perimeter. All stitches will be taken in this cut groove.





Linen saddle cord is drawn through a cake of beeswax to assure durability and tighter stitches. This is repeated several times to be certain the cord is well coated.

the sheath is kept straight. Too, all stitches must be in perfect alignment so that each penetrates the welt between the front and back panels.

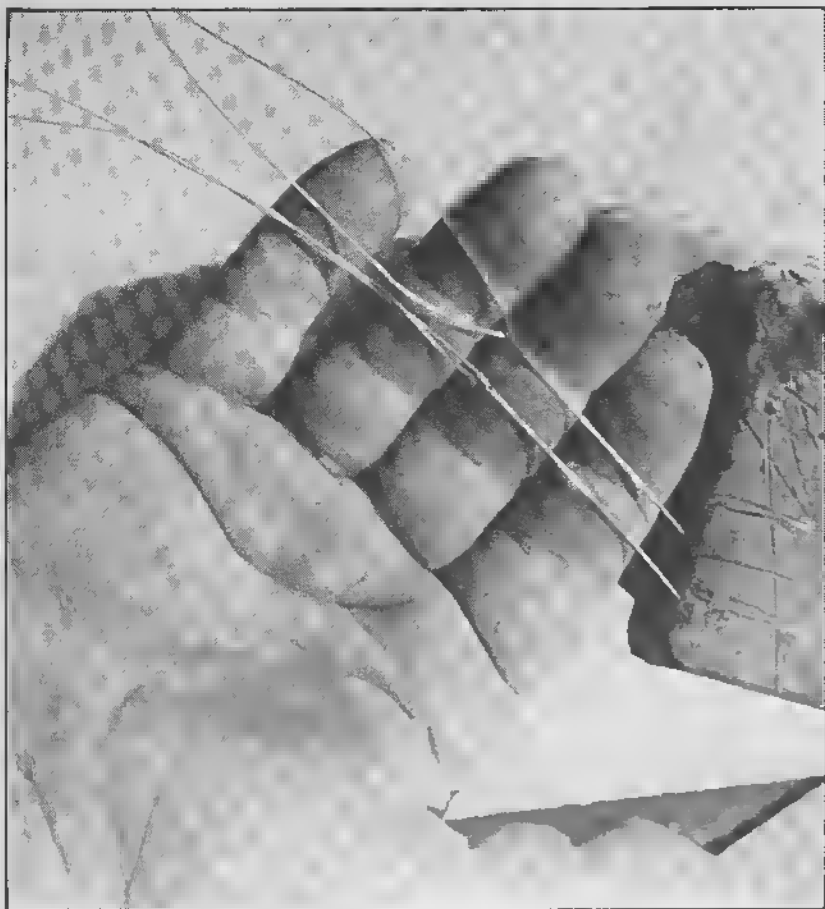
When hand-sewing leather, awling about six holes at a time results in a neater job. In other words, punch a series of six holes, all in perfect alignment, with the awl, stitch these, then punch six more holes. This is repeated until the entire perimeter of the sheath is sewn.

Let's assume that we have six holes awled through the sheath and are ready for the saddlemaker's stitch with two needles and four-cord linen.

One needle is passed through the first hole completely and drawn out until the thread is of equal length on both sides of the sheath. This same needle then is passed through the second hole, pulled reasonably snug.

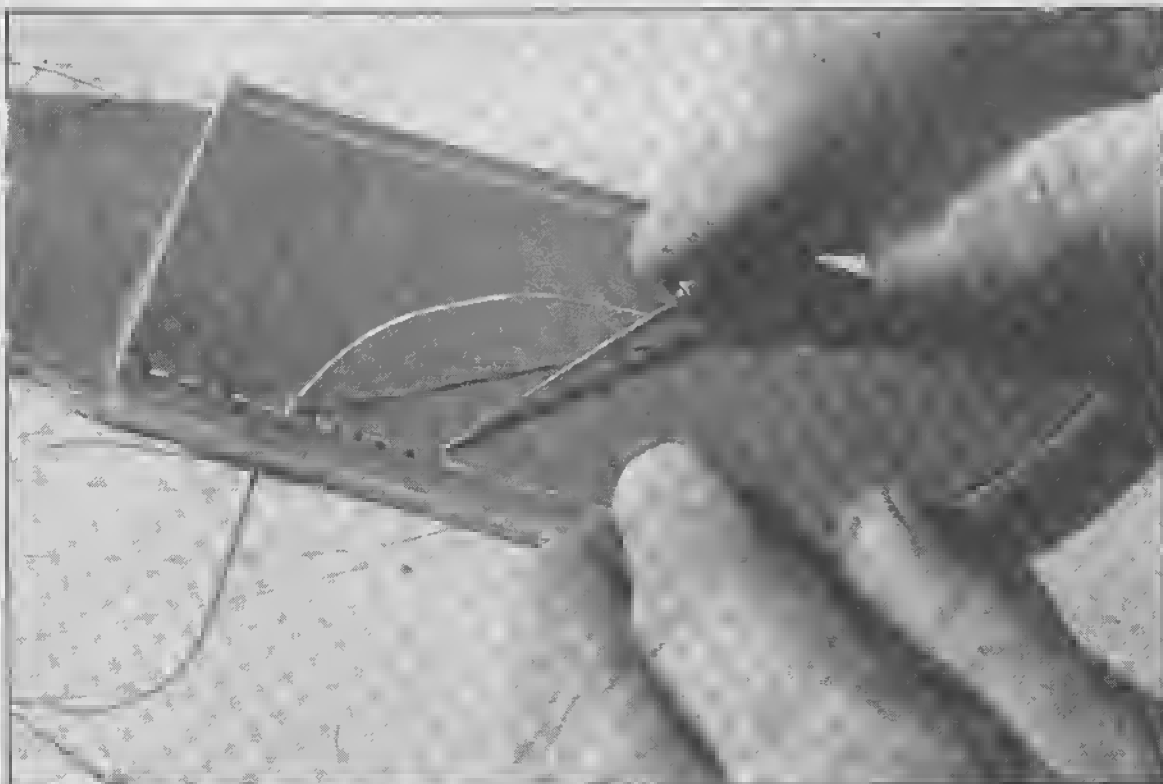
Now the second needle is passed through the second hole, forming a lock stitch. The first needle is passed through the third hole, pulled up snug, then is followed from the opposite side by the second needle. In a nut shell, this stitch consists of running each needle through the same preceding hole, but from opposite sides of the sheath.

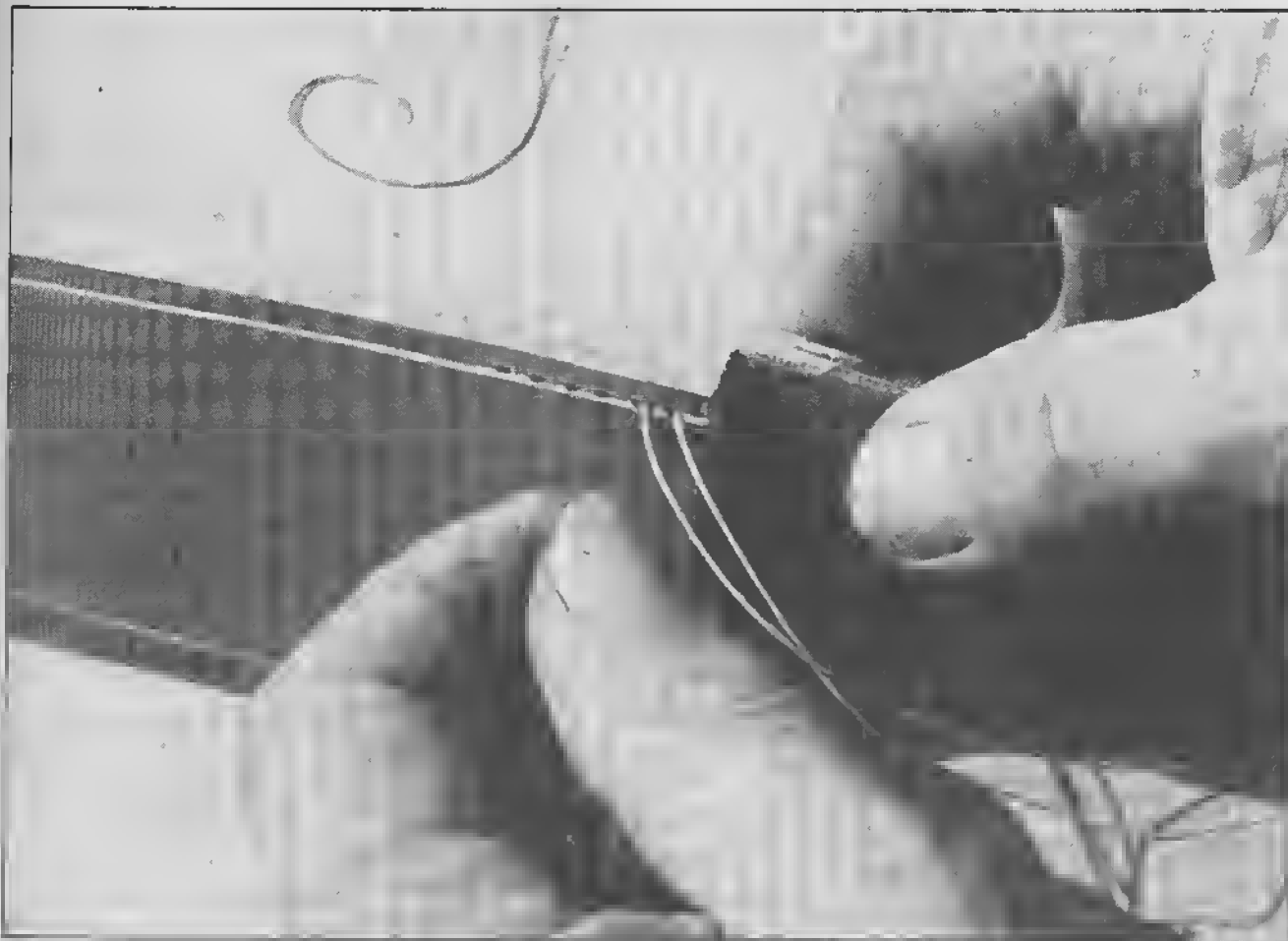
To use a thread longer than three feet could result in



A section of thread about three feet long and two medium-heavy stitching needles are required for the job. One of the needles is threaded into each end of the linen cord.

Only six holes should be punched and stitched at a time. This should assure a better appearance when job is done.





Saddlemakers' stitch calls for passing each needle through same hole from opposite side for a lock stitch.

snarls and tangles. When this cord is used up, retrace the stitches back about two holes, then proceed as before. The loose ends of the thread may be trimmed flush with the surface of the sheath with a sharp knife.

If a disc sander is available, the outer edges of the sewn sheath may be dressed down quickly to the proper dimensions. Be sure to allow no less than one-eighth-inch of leather to extend beyond the stitched area. To cut any closer than this could result in the stitches being cut through by the sander.

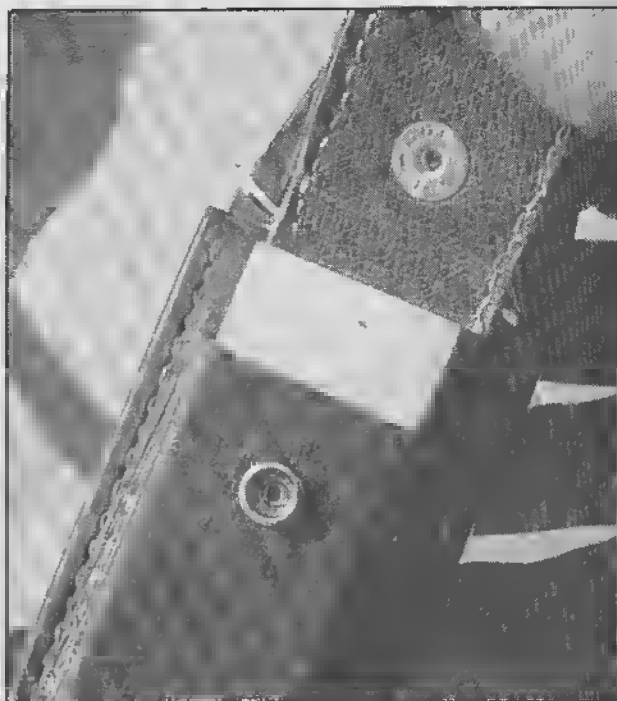
An edger of some sort, even a hand-made affair, may be utilized at this point to round over all sharp edges of the leather. This includes the belt loop and sheath proper. The

One method of holding work for sewing is to clamp the belt loop in a bench vise between cork jaws, but it is important that it be clamped only enough to hold firm.

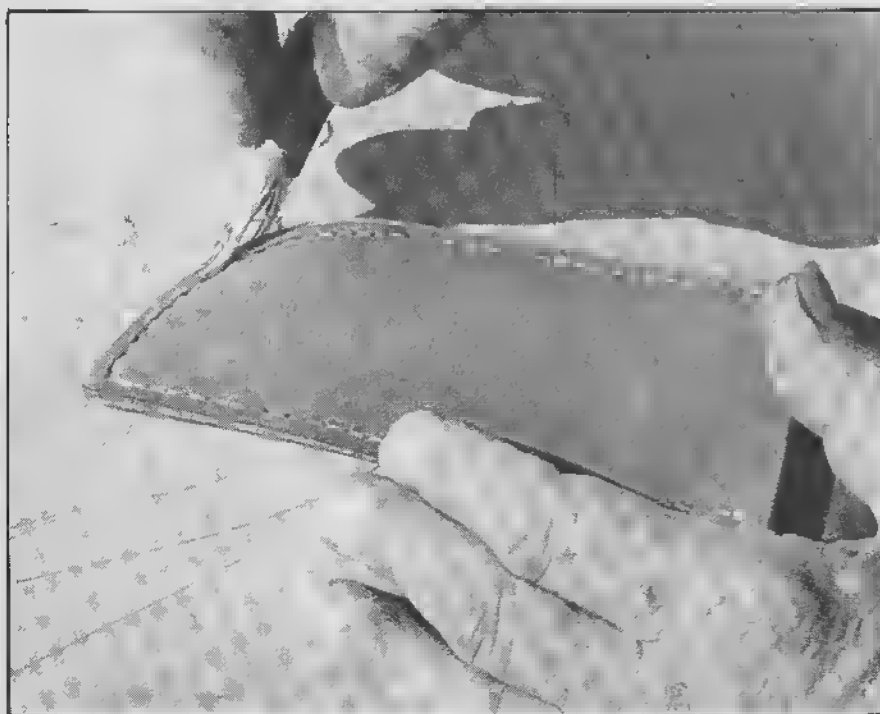




Leather edges rounded, sheath is dampened, rubbed briskly with ivory, smooth hardwood or even with a section of toothbrush handle. This smooths the surface.



An oil stone pouch can be added to the design. It is formed and sewn on before front section of the sheath is attached finally to the back section.



Once the sheath has been sewn, the sharp outer edges of the leather are rounded with an edger, using pressure.



Sheaths may vary in style, with or without pouches for oil stones. Second from left is sheath made in chapter.

sheath then is dampened well with water and all edges rubbed briskly with either a smooth piece of hardwood or an old toothbrush handle. The more the edges of the sheath are rubbed, the smoother and prettier they will become. To assure a perfect fit of the blade to sheath, the knife may be placed in the still-damp sheath and the entire blade area thoroughly rubbed in the same manner.

The sheath then is set aside. When dry, it can be given a light coating of neat's-foot oil, then polished with paste wax.

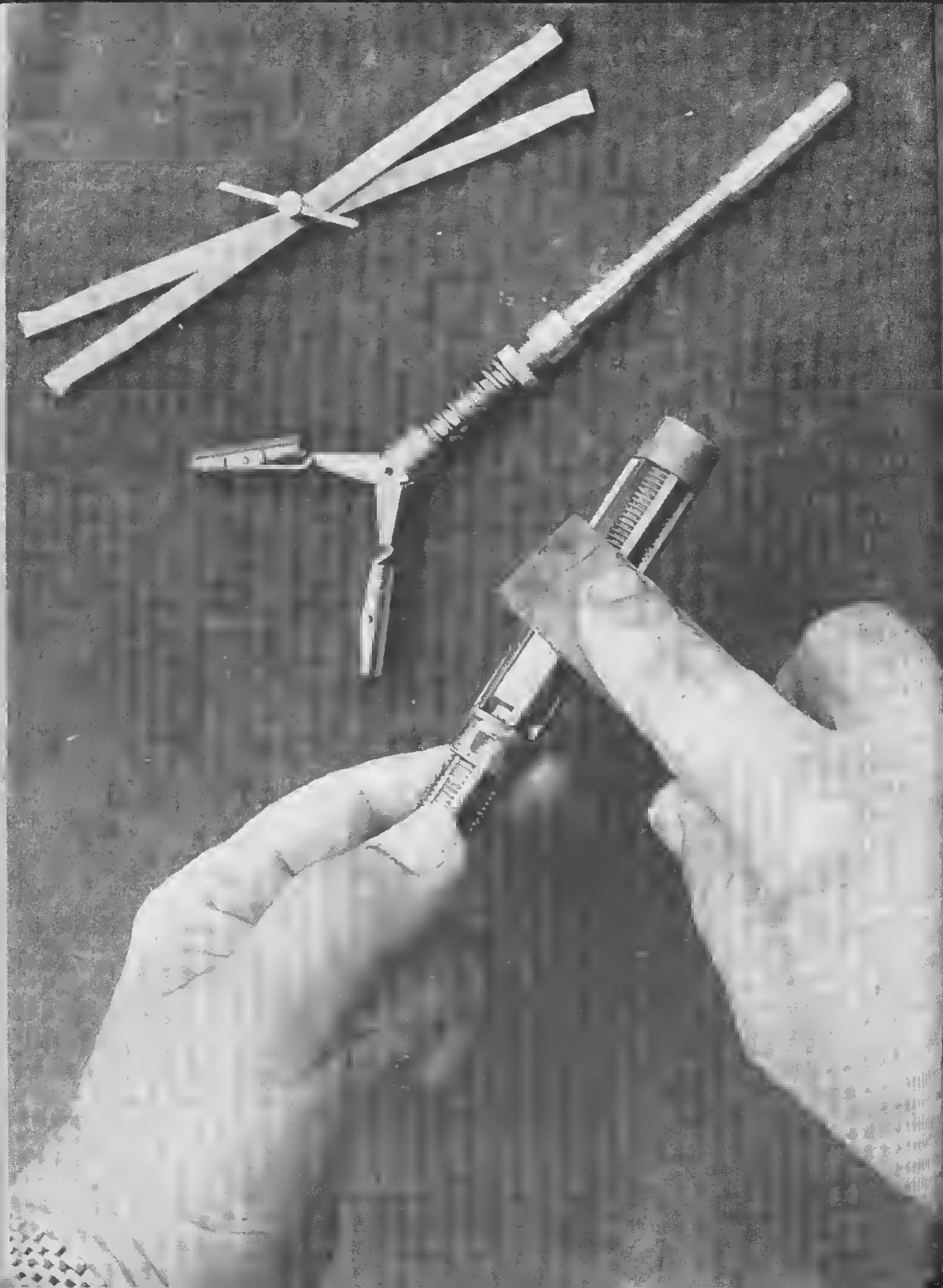
The final touch is to install a safety strap. The snap-button type extends from the belt loop down over the guard and snaps in place onto the sheath body. However, this is a

matter of personal choice.

Properly built, a knife sheath should last for several generations, with normal, proper care. Should it become water-soaked, never place it near a hot flame or heat of any type to dry out. Allow it to dry at a normal temperature.

On occasion, give it a thorough soaping with glycerine saddle soap, then buff with a soft cloth. Repeated baths in neat's-foot oil will only burn the leather and cause it to deteriorate at a rapid rate.

Finally, regardless of the quality of any knife sheath, never store any good knife for any length of time in it. Even though the blade may be well oiled, the leather is apt to rust it in time through condensation.



Chapter 24

A CHOICE FOR CHOKES

Simple Tools Can Be Used To Change The Choke Of Your Shotgun On The Kitchen Table!

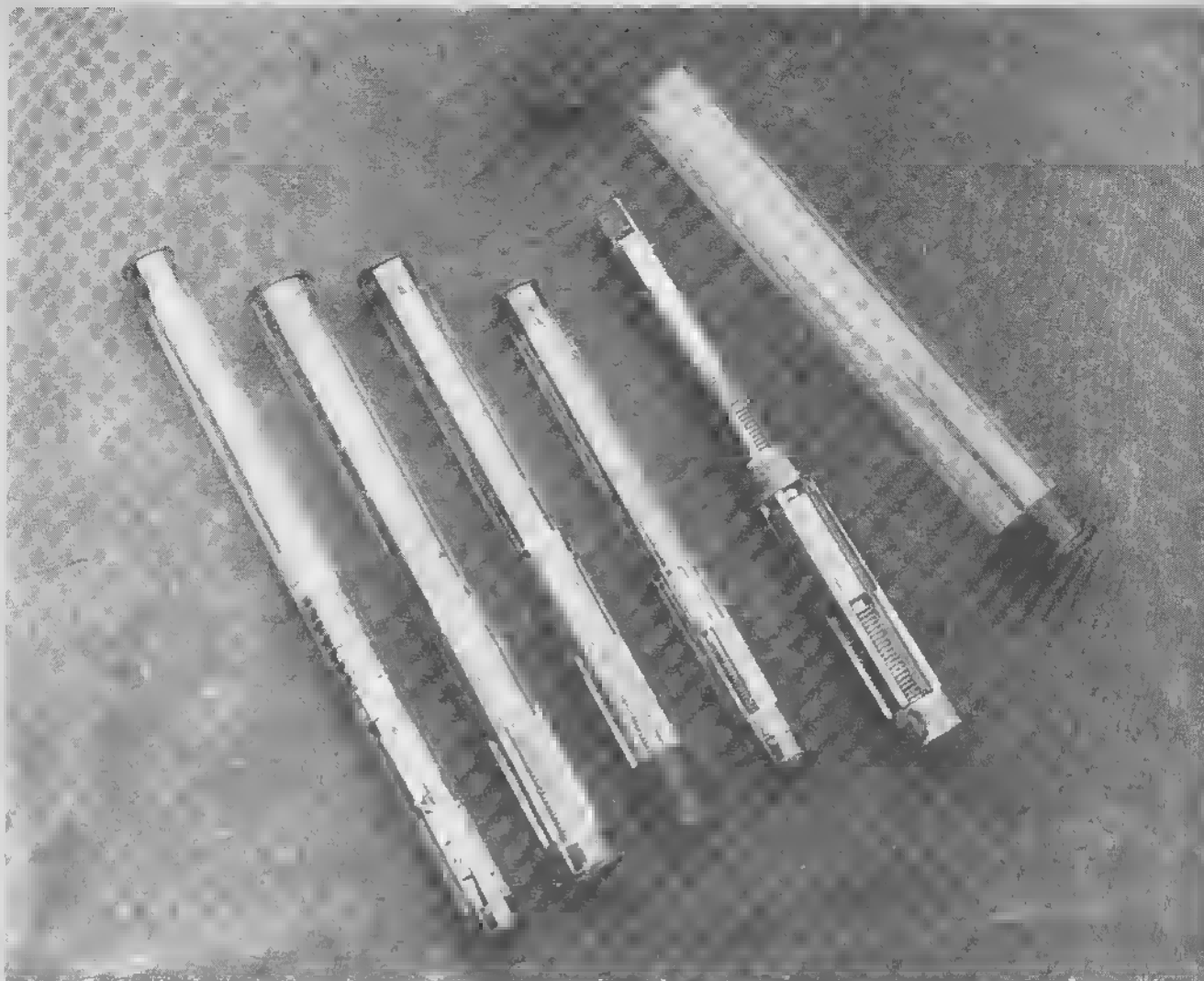
REGARDLESS of how they are used, the words choked, choking, choked up, choked down, choked back and choked off all mean basically the same. Daniel Webster defines these terms as meaning: 1. To strangle; suffocate; smother or stifle. 2. To block up or clog. 3. To hinder the action of and hold back.

All these definitions apply to the situation at hand: owning a shotgun with a nasty habit of shooting like a rifle when a little wider shot spread or cleaner pattern is desired.

Let's take the example of one man who acquired a fine double-barrel that had been designed specifically for trap shooting. He found that while the full choke of the trap gun was capable of getting the job done on game birds, he still

Left: Prior to actual use, the reamer should be honed on an Arkansas stone to assure it has a perfect cutting edge. In a pinch, the reamers can be used with barrel in horizontal position, if care is taken. The final honing operation should be accomplished, however, with barrel secure in a vise.





The best means of storing edged tools in your box or chest is to place each in a plastic tube after it has been given a preservative coating. (Right) The correct and safest way to assure a perfect job is to place the shotgun barrel in a bench vise in the perpendicular position, then run the reamer straight down the bore.

had to aim the thing like a rifle to hit anything with it. The shot spread out to forty yards or so was so concentrated that rifle-like aiming was mandatory.

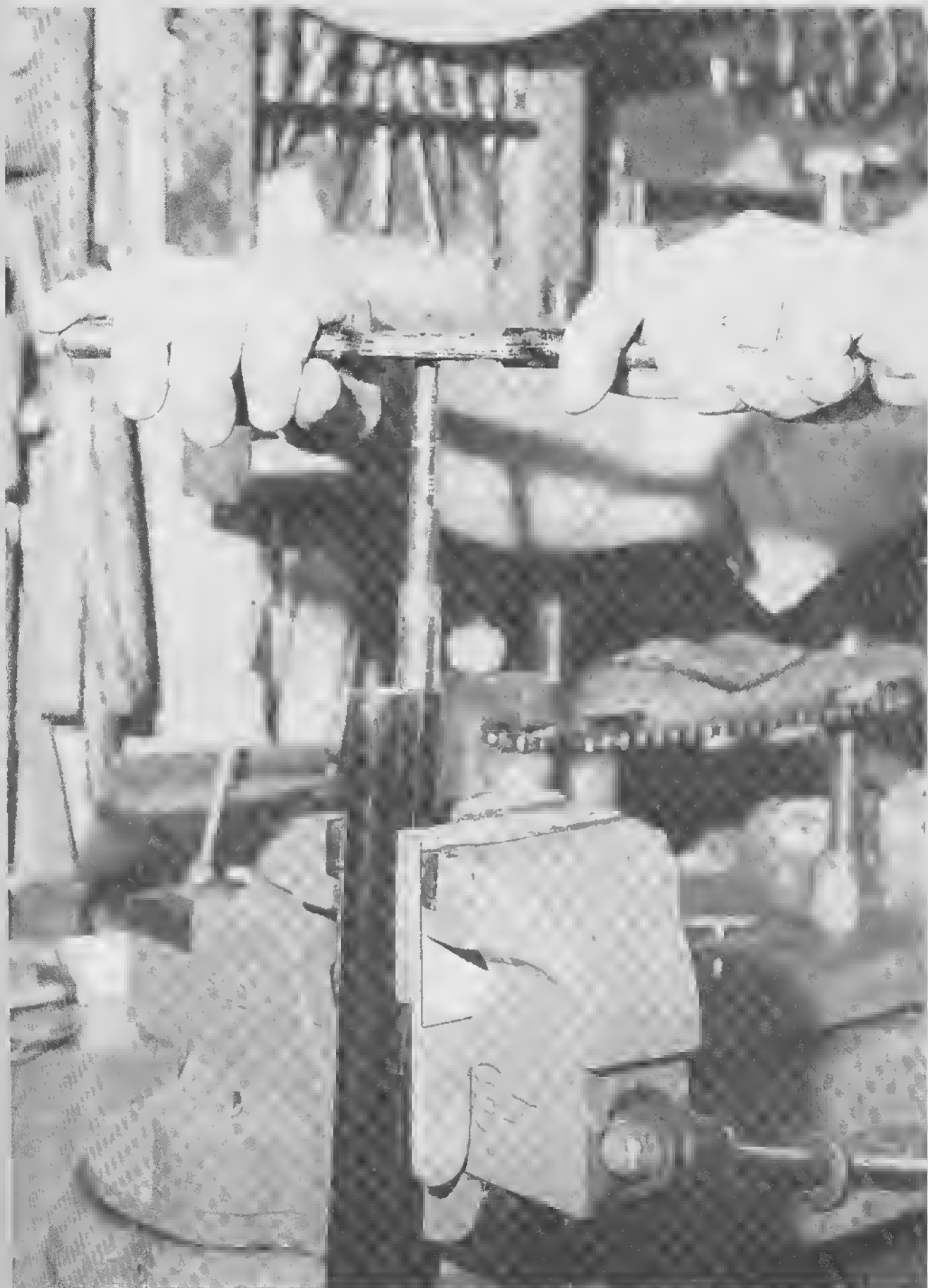
In desperation, he took this fine shotgun to a competent gunsmith, who opened up that extreme full choke to throw a wider pattern. Following this treatment, the owner found he was losing far less birds than before due to the improved shot pattern of the opened-up choke.

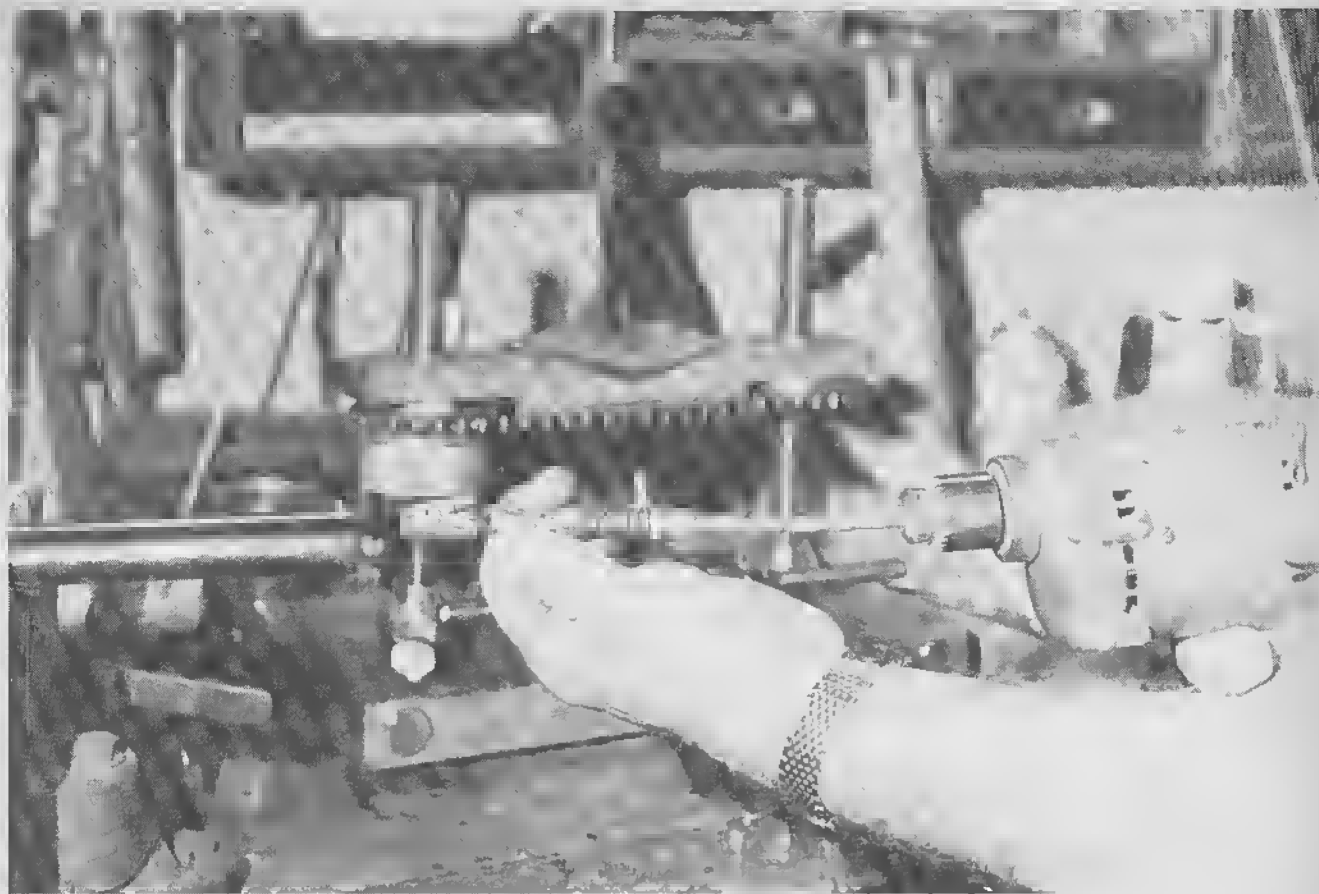
In the past, the tedious job of altering any shotgun choke — and doing it properly — was one best left to a competent gunsmith; one especially well versed in the fine art of shotgun barrel work. However, Brownell's Gunsmithing Supplies of Montezuma, Iowa, now has available a set of

tools so advanced in design that they can be used in choking situations by the gun owner himself.

This does not mean that every Tom, Dick and Harry should rush out and purchase a set of these tools for the purpose of altering their fine Parker A-1 Special or L.C. Smith trap-grade shotguns. It does mean that any man with a reasonable knowledge of shotgun bores, infinite patience and some know-how in the use of precision tools, not to mention regard for his guns, can open up a super-tight choke to throw an improved pattern in as little as twenty minutes.

Opening up any choked shotgun tube involves two basic adjustments. The hunter's adjustment will be com-





Once the choke has been reamed to specifications, the hone is placed in a drill motor, then spring-loaded stones are inserted in the bore to polish. Author has found that use of a lubricating oil will speed process.

paratively simple in that he will want his barrel choked from full to improved modified or some other straight-forward boring. Too, most hunters will use standard factory ammunition.

On the other hand, the claybird shooter probably will want the choke opened up just a trifle to give a slightly enlarged shot pattern. This, most generally, is with his special breed of handloaded shotshells.

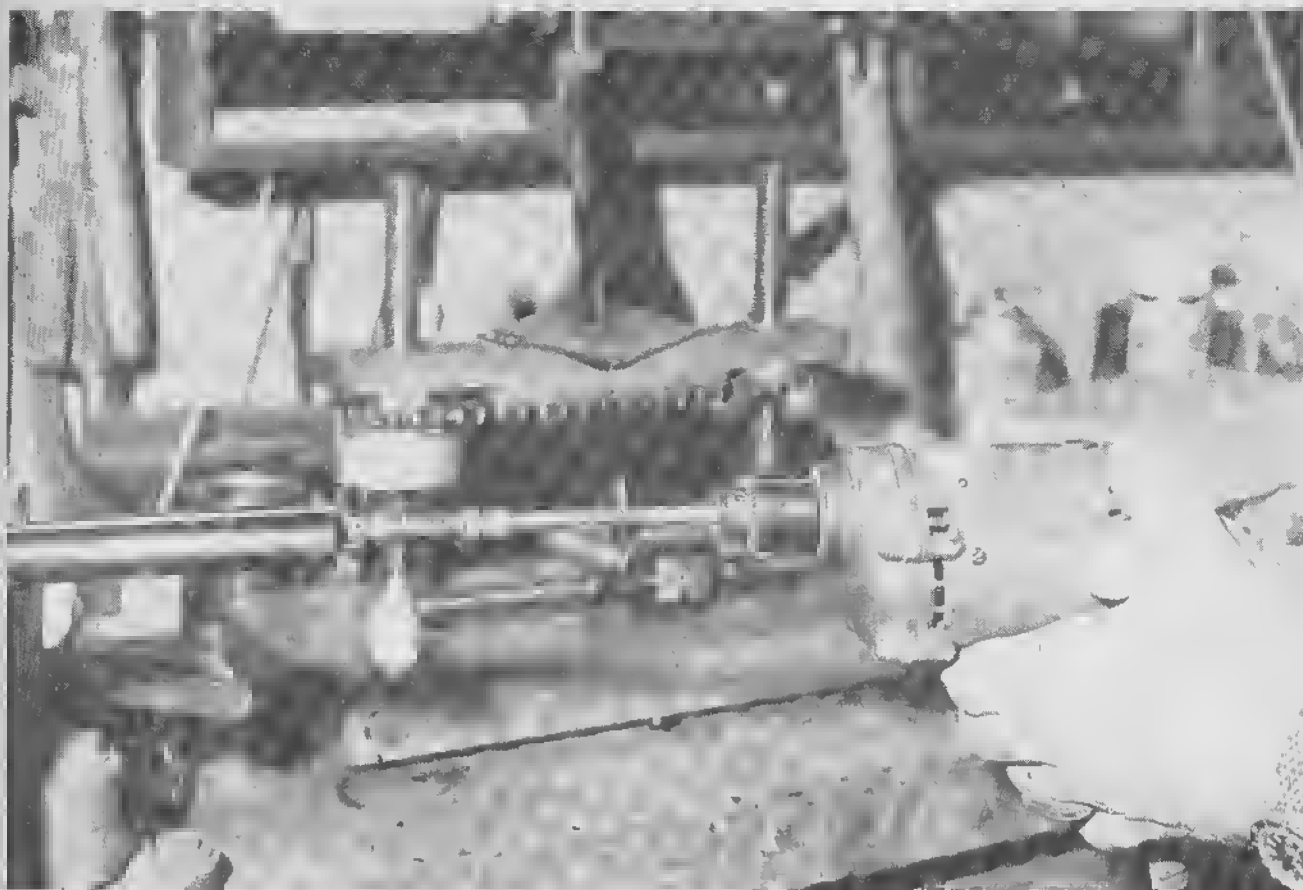
The tools mentioned consist of special-angle blade choke reamers in appropriate sizes to fit 28-, 20-, 16- and 12-gauge shotguns.

Also needed for a perfect job will be an adjustable barrel hone with flexible drive for a one-fourth-inch electric drill and one of the new barrel comparison calipers. The four reamers listed as well as the barrel hone and caliper will handle any choke requirements from cylinder bore in the 12-gauge on through the full choke of a 28-gauge. Only one of these reamers is required for each gun. The complete

outfit, including the barrel hone, calipers and reamers, is available from Brownell's.

The actual working dimensions of each reamer will exceed factory maximum/minimum specifications slightly. The angled blades of these reamers provide a perfectly flat slicing cut at all diameters. The blades remain absolutely true at all sizes and adjustments and do not bulge or curve, thus assuring proper bore configuration. As with most reamers, the cutting edges of each blade should be honed with an Arkansas stone for best performance. If you do not know how to handle this sharpening, seek professional help.

Prior to beginning the job, the barrel should be removed from the action. If this is not possible, precautions must be taken to assure that no metal cuttings drop into the action during the reaming operation. I have found that by inserting a tight-fitting patch or patches about six inches down the bore, the possibility of this is eliminated to a great



In actual use, the hone is worked slowly back and forth in the bore to assure entire reamed section is polished.

extent. When the reaming operations are completed, the patches are pushed out the muzzle from the opposite end of the barrel, thus clearing all cuttings from the barrel.

The barrel is placed in a padded bench vise in a vertical position, muzzle toward the ceiling and about waist high. This is important, as cutting with the barrel in a horizontal position has a tendency to remove more metal from the bottom due to the weight of the reamer.

Let's assume that we are doing a 12-gauge and using the No. E 12-gauge reamer. Adjust the reamer by backing off the rear adjustment nut half a turn maximum at a time and tightening the front adjustment nut. Adjust the reamer a small amount at a time in this manner, until it just touches the sides of the choke. Apply cutting oil and make the first cut by rotating the reamer — now held in a tap wrench — in a clockwise direction allowing the weight of the reamer and wrench alone to furnish the pressure. When the reamer has cut its full length, continue rotating in the same direction

and, at the same time, slowly withdraw it from the barrel.

Brush the reamer and clean the chips from the bore. The bore now should be measured with the calipers and, if necessary, make another cut if additional metal is to be removed. It is best to test fire the gun occasionally during the reaming operation, using the loads normally shot in the gun to assure the correct percentage at a given yardage.

When the correct pattern is achieved, the final .001-inch should be removed with the hone to assure a satiny sheen and glassy smoothness to the reamed area.

The adjustments of the reamer are gauged by the flats on the adjusting nuts. Position this flat between two of the blades on the cutter for the initial cut. For each additional cut, the reamer is removed from the choke as outlined above, the adjusting nut is moved to the next setting located between the next two blades. The second cut will remove .002-inch from the choke diameter.



The Brownell choke adjusting kit is available in four gauges: 28, 20, 16 and 12. Each of the angle-blade reamers is capable of doing a perfect job if used correctly and with care. The furnished hone and calipers are necessary.

The barrel comparison caliper is used to measure the amount of metal removed from the choke by the reamer. One end is inserted into the barrel and opened to maximum. The screw lock is tightened, then the opposite end of the caliper may be miked from the information needed. While these calipers may appear simple in construction, they are extremely difficult to manufacture and are capable of measurements within a plus-minus of .002-inch. This is overly sufficient when bore diameters of various makes of shotguns vary so greatly.

As with most things new in the gunsmithing line, I like to find out the potential for myself. My initial experience with the tools just described began with a muzzleloading shotgun from the Dixie Gun Works of Union City, Tennessee.

On the first hunt with this gun, I found the shot was choked so tightly that the spread couldn't have been much over a foot or so at about forty yards. This meant that I had to handle this gun like a rifle for all my bird shooting. Consequently, I missed far more birds than I bagged.

I found that the No. D 16-gauge reamer was a perfect fit

into the choked muzzle of the old charcoal burner, so I went to work exactly as outlined here. The only difference was that I did the entire job afield sans the niceties of a bench vise or workbench. Two passes through the muzzle of the shotgun and I had a near-perfect thirty-six-inch pattern of shot at about forty yards. This pattern opened up slightly after I had honed the choke to a high polish, but it was still ideal for downing pheasant, chukar and quail at up to sixty yards.

The angle blade choke reamers are simple to use. They do a clean, professional job in a fraction of the time necessary for other tools designed for the same purpose. A complete book of detailed instructions for use of these reamers also is available at \$3 per copy from Brownell's. And if you are capable of close tolerances in handcraftsmanship, an ardent shotgunner who wishes to improve the potential of some of his guns, then one or more of these reamers to fit the various guns you want improved is money well spent.

Like all precision tools, these choke reamers deserve kind treatment. Keep them clean and well oiled during storage.

The hone is simple in design and the spring-loaded stones fit snugly into the bore to polish away possible roughness.

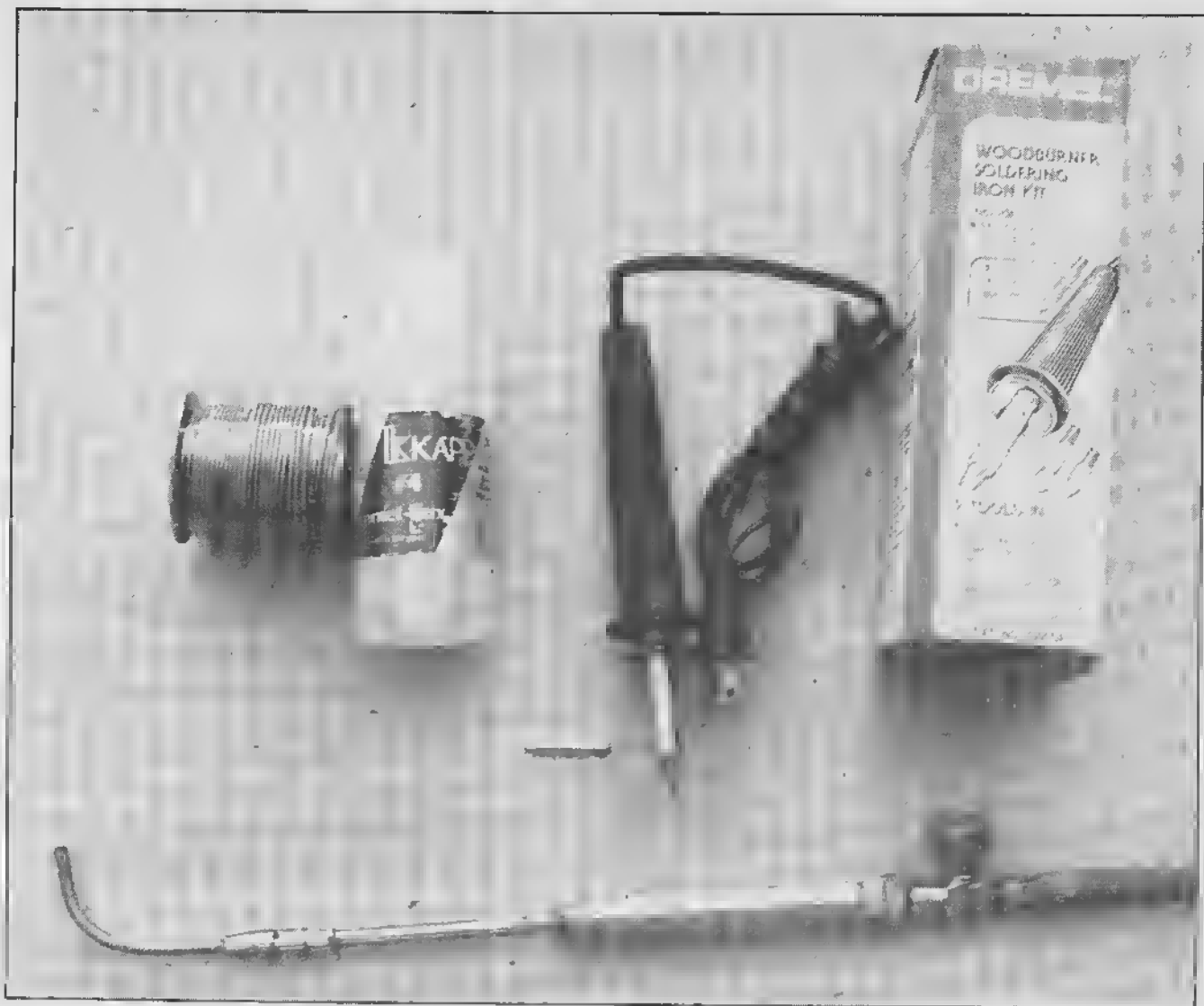


Chapter 25

SOLDERING SAVVY

*Knowing What You Can — And Can't Do — With
The Various Solders Is The Key To Success*





Left: Sweat soldering a ramp on a rifle barrel is fairly simple. If one has the right equipment. Author uses his Presto-Lite torch to install a ramp held in position with Brownell's ramp soldering jig. (Above) Force 44, a silver-bearing solder, is preferred by Bish for most soldering work on firearms. It can be worked successfully with an electric soldering iron such as the Dremel model shown here or one can use a small torch to melt the solder.

ONE OF the most misunderstood yet fundamental phases of gun work is the chore of soldering two pieces of metal into a lasting union.

Such components as custom bolt handles, hammers, triggers and other working parts of the gun's mechanism made of steel cannot be joined satisfactorily with soft solder. To be bonded properly, these parts must be welded using an oxy-acetylene torch and the proper welding rod, preferably one with 3½ percent nickel steel.

Yet over the years, I have seen at least a jillion gun parts that had been soft-soldered together by some neophyte to the gun fixin' business. These same parts held together, if at all, only until the first time the joint was placed under stress. In gunsmithing, both soft solder and the harder silver solder have definite uses, but one must know where and how it may be used with satisfactory results.

The gun craftsman is faced quite often with such chores as repairing sight beads, resoldering ribs that have come loose on shotguns, installing new barrel liners in shot-out barrels, repairing broken brass and silver patchboxes and inlays on Kentucky-type rifles; there are countless similar repairs for firearms, both modern and antique.

The common solders such as rosin core and others used in other trades are not necessarily adapted to gun work. Among working professional gunsmiths, the most extensively used soft solder is Force 44, which is available from Brownell's. This solder is used in conjunction with #4 Comet Flux to produce a soldered joint that is durable and strong, even after being immersed in a hot bluing tank. The advantage of Force 44, when properly used, is that it flows smoothly at 475 degrees Fahrenheit. A mixture of four percent silver and ninety-six percent pure tin, it successfully joins such metals as steel, stainless steel, copper,



The metal that is to be soldered must be cleaned, then polished. Bish favors the Dremel Moto-Tool with either a wire brush, emery disc or a buffing head. He has found this combination ideal for small, intricate solder jobs.

brass, silver and nickel-silver into a lasting unit. However, it should not be used on steel gun parts that will see extensive stress or wear. There are limitations. It even sounds foolish, but I have seen heavy mainsprings that had been broken with attempts at repair done with Force 44. It cannot be done! Springs cannot be welded or soldered together and be expected to retain their tension. The welded or soldered joint will always rebreak when the spring is bent.

The secret of soldering, whether with soft solder or the harder, more durable silver solder, is to make certain the two components are absolutely clean and the metal bright. To attempt to solder together two pieces of metal that are dirty with oxidation, rust, dirt, grease or any other foreign substance is a waste of time. The joint will not accept the solder in a smooth flowing manner as it should. The result is a sloppy-looking job and one that is weak.

While there are several methods for applying heat in soldering, I prefer either a small acetylene torch, or for small jobs such as installing new beads on gun sights, a soldering iron.

The soldering iron I have used for some years with great success is the Dremel electric soldering iron which doubles as a woodburning tool. It is great for soldering and, by merely changing the tip, it is ideal for antiquing gunstocks and striping ramrods on muzzleloading rifles using the woodburning tip that comes with the kit.

Force 44 solder is available in rolls of one ounce, one-quarter- or one-pound spools. It also is available in fluxed form, having its own flux right in the core of the wire. A solder known as Swif 50-50 is a tin/lead alloy and comes in a paste form. I have used this solder to some extent with good results for tinning a new barrel liner or installing ramp front sights.

With careful workmanship, such components as front sight ramps, shotgun ribs, sights and sweat-on type European sling swivels can be installed on a perfect blue job without marring the finish in the least. Minor touch-up with cold blue may be necessary along the hairline soldered joint. However, jobs such as this do require that the craftsman have a good working knowledge of the process.

For the most part, soldering jobs involve only small areas, as with the installation of new beads on front sights



Left: Small front sights that have had their beads knocked off can be repaired easily with the soldering methods outlined in this chapter. (Below) The Force 44 silver-bearing solder, when used with #4 Comet Flux, produces as fine a soldered joining as possible. It flows smoothly at 475F degrees and proves strength up to 25,000 pounds per square-inch. It can be blued with cold gun blue.

or sweating a ramp front sight onto a rifle barrel. I have found that my Dremel Moto-tool is ideal for getting these areas immaculately clean, using the appropriate sanding disc, wire brush or metal burr chucked into the tool. This is far faster than attempting to do it by hand and it does a better job.

It is common during soldering jobs to have the solder run into areas where it isn't wanted. This necessitates cleaning that solder run from the forbidden area. Modern technology has taken care of this with an item known as Brownell's soldering talc. This metal workers' talc is packaged in a form resembling a crayon. Merely rub the area with the talc where solder is not wanted and it will prevent the solder from adhering.

If installing a front ramp sight on a rifle, first trace the outline of the ramp onto the barrel where it is to be installed. Then remove the ramp and rub the entire area outside these lines with the talc crayon. Presto, a perfect no-run solder job. Incidentally, great care is needed in using the #4 Comet Flux, a cleansing acid, to prevent blued surfaces of the gun from being streaked or bleached out. Use this flux sparingly; a drop at a time does wonders.

Another aid to good soldering is a product known as Heat Stop, which is a heat control paste. Applied properly, this paste acts as an anti-flux when soldering and prevents heat flow into previously soldered areas. Heat Stop will not damage blued surfaces and is cleaned from the work easily. This substance is even used by emergency crews to protect victims who must be cut from wreckage with acetylene torches. Just follow the directions on the container.





A compact tank setup such as this is ideal for both soft and hard solder work. With this Presto-Lite unit, the tank will last several months before refilling is required. This Tor-ft torch has been used for 30-odd years.

Soft solders are those containing various mixtures of tin, lead and in the case of Force 44, some pure silver for added strength. The harder silver solders are just that; an alloy of silver capable of brazing steel, stainless steel, copper, copper alloys, nickel and its alloys or any combination of these. The silver solder I've found best suited to gun work is Silvaloy Silver Solder or Silvaloy 45. This solder is available in ribbon form measuring .005-inch thickness by one-half-inch in width or in wire form 1/32-inch in diameter. Silvaloy has a melting temperature of 1125 degrees Fahrenheit, and the flow point is 1145 degrees. A standard silver soldering paste flux is used.

The question will arise, as to which to use for a specific job — soft or silver solder. Light jobs such as installation of new beads on front sights or ramps on barrels where minimum heat is desired call for soft solder with a melting and

flow point of only 475 degrees. For heavier metals, such as steel triggers, hammers and the like where more strength is desired, one should use the harder silver solders with its flow point of 1145 degrees.

While silver solder cannot replace a good oxy-acetylene or heli-arc weld on iron or steel parts, it is acceptable for repair of cracked or broken parts, such as triggers and hammer spurs. These repairs are hardly detectable once the silver union is colored with the Solder Black produced by Birchwood-Casey. Also, most cold gun blues can be used to darken the soldered seam to the point that it is undetectable.

In gun work, a solder often is needed that has an extremely low melting point, yet is capable of making a strong bond. Such a solder is Tix Soft Solder which has a melting point of only 275F — more than 100 degrees lower



Swift 50-50 solder, packaged in four-ounce jars and one-pound cans, is a favorite with many gunsmiths for sweating on ramps, ribs, sights, et al. In paste form, this solder is applied in a thin coat to one side of the surface to be soldered. Applied heat creates strength of about 2000 psi.

than lead/tin solders. Often called "The hardest soft solder on earth," its bond strength is 4000 pounds per square-inch (psi) and it can be used to solder gold, silver, stainless steel, alnico, pewter, most alloys and all of the other solderable metals.

Tix soft solder will not tarnish, so it can be left in the white if desired, or can be blued with Brownell's T-4 bluing solution. It contains no silver or bismuth and works beautifully for attaching ribs, ramps, precious metal inlays and overlays. For electronics and radio buffs, it is ideal for soldering solid state components without a heat sink and will not damage print boards.

It is common these days for some armasmakers to produce certain firearms components of aluminum or aluminum alloys. Included are such parts as trigger guards, butt plates, cartridge magazines and clips, scope rings and mounts. On occasion, these parts may be broken or badly cracked through abuse or accident and require repairs.

Most professional gunsmiths will recommend that such a damaged gun component be replaced, but the occasion

still arises when it is necessary to repair the original part due to factory shortages or a refusal to replace such parts on short notice.

A good gunsmith should be capable of repairing damaged gun parts made of aluminum with a product known as Multicore solder. This product consists of a tin/lead/silver alloy specifically formulated for soldering aluminum. It is highly corrosion resistant and no precleaning or sanding of the parts to be soldered is necessary. It includes an extra-active flux that prepares the surface for soldering.

The melting range is 354 to 518 degrees Fahrenheit and the actual soldering range is from 600 to 700 degrees. Multicore solder also may be used on brass, copper, tin plate, nickel and steel. Properly used, Multicore solder will produce repairs to aluminum gun components that are undetectable. Once the job is done, and the repaired section polished, it may be colored using Aluminum Black, a Birchwood-Casey product.

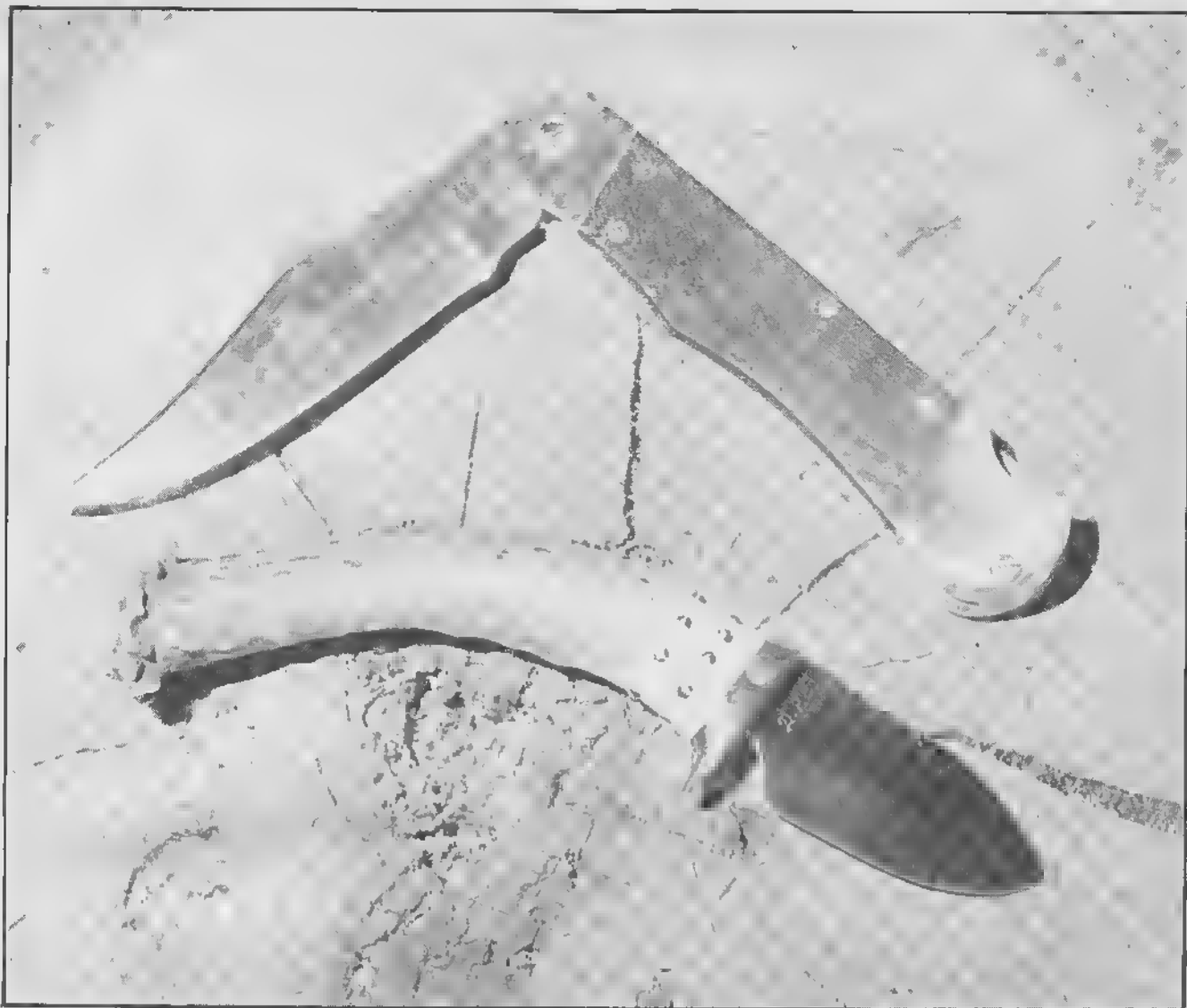
Any number of other solders are available, but those solders discussed should handle any firearms work.

AMATEUR TO PRO

*Today's Hobbyists Are Displaying The
Talents That Lead To Demand For Their Work*

Gunsmithing hobbyist Dennis Emmanuel inspects his progress on the first Kentucky-type flintlock rifle he has attempted to build. The beautifully inlaid patchbox in the stock is the result of a lot of trial and error early in his career.





The folding pocketknife and patch-cutting knife both were made by Dennis Emmanuel to accompany his flintlock rifle.

AT ONE TIME or another, all professional gun craftsmen were amateurs. In the beginning, they probably worked on firearms almost solely for the enjoyment of it. Later, as they became more proficient, their skills increasing, they might have undergone an apprenticeship in an established gun shop or factory to further increase their knowledge of what makes firearms tick. Or they may have enrolled in one of the trade schools where gunsmithing was taught. At any length, the desire had to be there to make gun work a life profession.

Most of the professionals I know today work on and

repair firearms as a hobby as well as a daily chore to put meat and potatoes on the table for themselves and their families. Gun work is a real challenge. No two jobs are exactly alike, and when one considers that there are a jillion different types of rifles, shotguns and pistols — to say nothing of ancient weapons such as the snaphaunce, flintlock, percussion and a myriad of early, obsolete cartridge models — it becomes clear that any person who desires to become a gun craftsman must have a highly developed sense of curiosity. No one knows all there is to know about any single subject, but the gunsmith must have a working knowledge of what makes most guns function



Above: Emmanuel puts the finishing touches on an old Sharps carbine he has repaired for his collection of weapons from the Indian Wars of the last century. (Right) Repair of a Star double-action revolver of the Civil War era is not a chore for the beginning gun hobbyist to undertake. The mechanism requires a good deal of gunsmithing know-how.

and the ability to determine the cause of malfunctions. He must be able to correct those malfunctions, returning the firearm to safe and operable condition.

During some four decades or more in the field, I have seen some pretty sad examples who passed themselves off as professional gunsmiths. I have cringed many times as I watched them perform acts of mayhem on otherwise fine firearms. I have seen unnecessary holes drilled into receivers, parts that were foreign to the gun's mechanism installed, stocks butchered beyond repair and a thousand other atrocities performed on innocent armament. This type of gun hack has never learned to say, "Sorry, but I am not equipped to do this type of work" or "I don't understand this type of action, so am not qualified to work on it." The customer would surely appreciate such honesty. To

proceed on a job with absolutely no knowledge of that particular gun verges on a criminal act. There ought to be a law.

At the other extreme, in every town and hamlet throughout this country countless craftsmen are working in garages, attics and basements to turn out what qualifies as fine work on a hobby basis. In many cases, these individuals will be the professional guncraftsmen of tomorrow. I know several of these craftsmen personally. I have examined many of their finished projects and consider the workmanship to be superlative. Multiply these several craftsmen by thousands just like them located across the entire country, and one begins to have some understanding of the appeal of gun work.





Frank Rosselot's backyard shop is a treasure of modern, obsolete and antique rifles, shotguns, handguns. While gun parts appear to lie about in confusion, the craftsman knows where everything is that he requires.



Rosselot looks over two of his new acquisitions. On left is a Marlin rifle with special order .40-65 cal. barrel. On right is 1886 Winchester in .45-70 he built from spare parts, collecting them over a long period.



Rosselot's latest creation is a sporting rifle that uses a .460 Weatherby case necked up to accept a .50 bullet. He calls this gun his Ideal Dinosaur Plinker.



The huge .50 caliber bore of his sporting rifle is held next to that of a 7mm magnum (right) for the sake of comparison. Rosselot is a firm believer in a big bore.

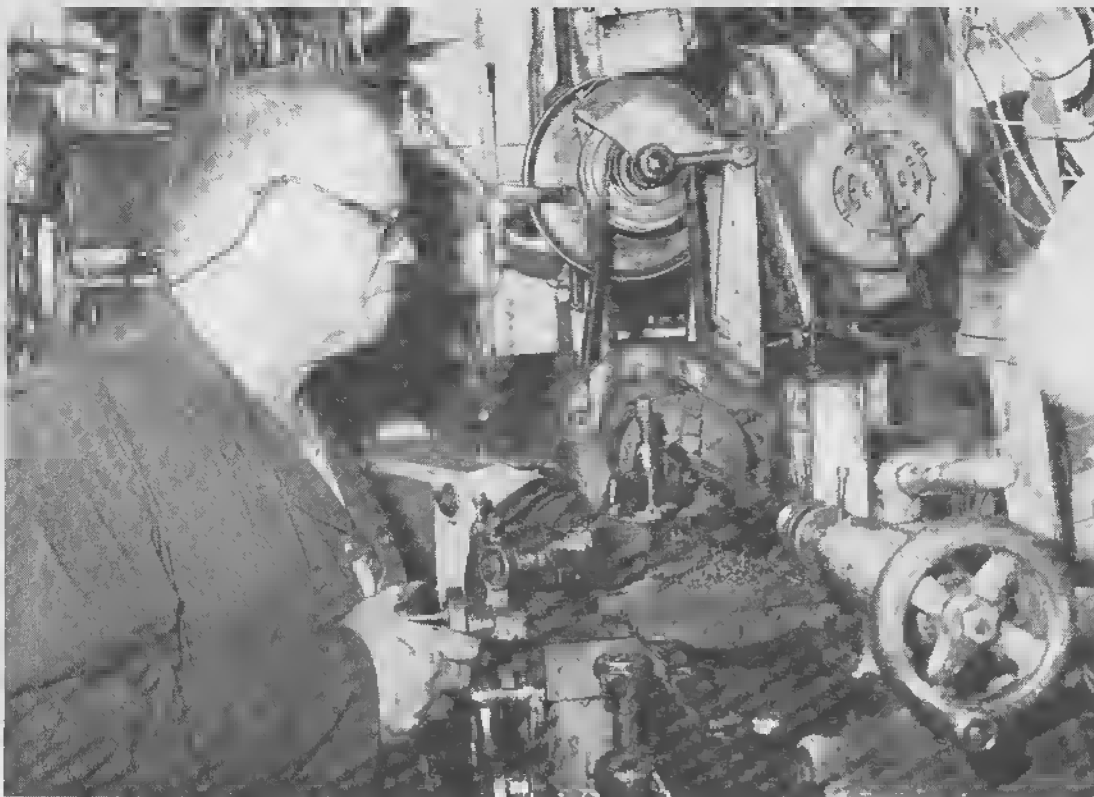
The hobby craftsman's efforts are not limited solely to working on modern firearms. Many turn their talents to making, entirely by hand, operating miniatures of ancient firearms and other battle weapons. These miniatures, precisely made, can easily be sold to interested collectors for substantial amounts of coin of the realm.

One such craftsman, Californian Dennis Emmanuel, has been a gun hobbyist for several years. His shop is quite modest and occupies a corner in his garage. His workbench is also quite small and his tools limited to the bare necessities. There are no handsome lathes, expensive milling machines or even a drill press, yet he is able to turn out some of the nicest work one will ever see. All of his work is accomplished with handtools.

Dennis Emmanuel's hobby of guncrafting began some

years ago when he decided to begin collecting weapons and related items of the U.S. Cavalry from 1860 through 1918. He soon came to realize that for the repair and restoration of certain aged weapons in his collection, he would have to do it himself. Let's face it, how many gunsmiths today know and understand the mechanisms of such rifles and carbines as the Maynard, Spencer, Sharps or pistols such as the Star, percussion Colts and Remingtons. There were Cavalry sabers of the American Indian Wars that needed refurbishing and leather goods galore that needed treating with preservatives after being mended and repaired.

Emmanuel taught himself to do all these things and do them well. Arms and equipment of the era of the American Indian Wars are quite rare, so when a person expends considerable cash in acquiring a sizable array of these rarities,



Frank Rosselot turns a rifle barrel on his somewhat aged lathe in his backyard gunshop. The barrel is to be used on one of the big-bore rifles which he builds for his own use and for other big gun fanciers.

Rosselot built this fine Mauser sporter in .25/06 for a friend over a period of several months. This craftsman expresses a preference for restoring older rifles and carbines such as Marlin, Winchester.





Recently restored by Rosselot, this Marlin rifle in .40-65 caliber is quite rare in that it is equipped with an extra-long special-order barrel from the Marlin factory. Work on such collector items requires a special understanding.

then he wants any needed repairs done in such a way that the work is undetectable.

Aside from working on his outstanding Cavalry collection, Emmanuel also does work for other collectors. The money he earns from his sideline he invests in needed tools and equipment for his shop. In his spare time, he hand manufactures fine miniatures such as percussion gun locks, single-shot pistols and knives. The majority of these mini pieces have been snapped up by advanced collectors. He currently is working on a miniature Hawken Plains rifle and, from what I saw of the parts in the process, it will be a real beauty. Several advanced collectors already are bidding on the rifle.



Rosselot also works on a variety of shotguns, many with collector value, collecting parts to make them operable. At his right are forty-odd aged Marlins he has reclaimed.

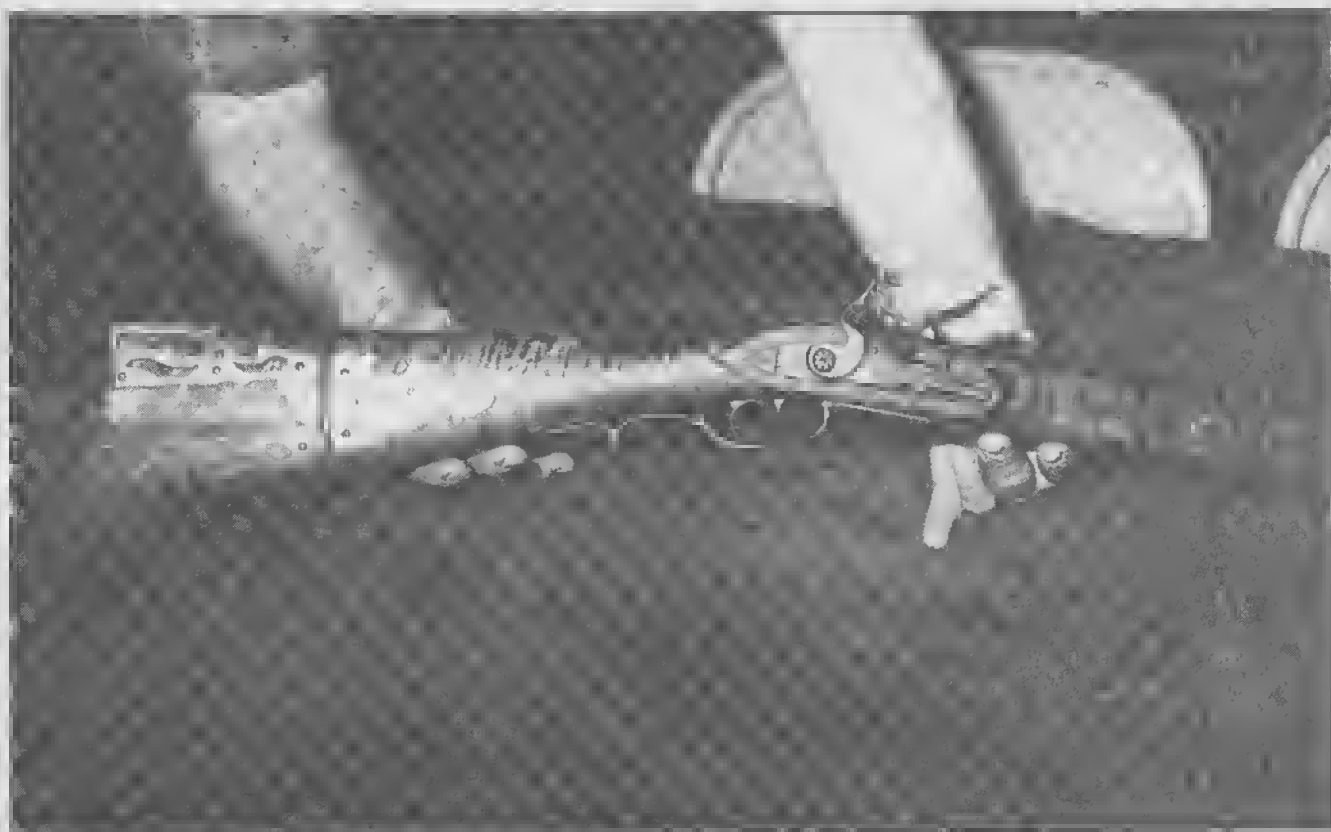
The California craftsman displays pronghorn antelope horns and rack from a deer which he took last year on a Wyoming hunt, using a rifle of his own concoction.

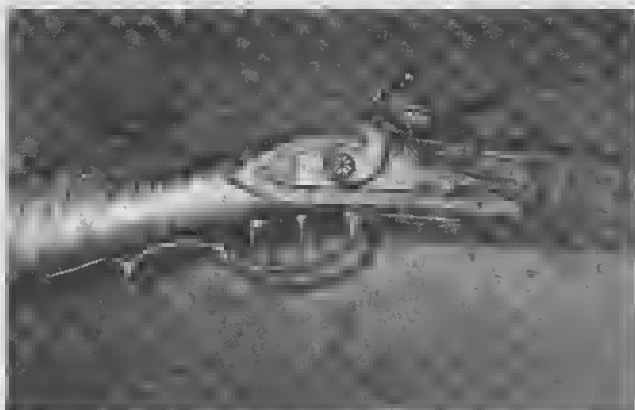




Dennis Emmanuel is justly proud of his completed rifle in Pennsylvania-type configuration after weeks of hard labor.

The lock and stock section of this graceful black powder rifle show the care and craftsmanship exercised in its construction. Note the rifle's extra-fancy patchbox, which features a lid that is activated by a push button.





Equipped with a set trigger, the flintlock received added honing and smoothing. Note tiger-stripes on maple stock.



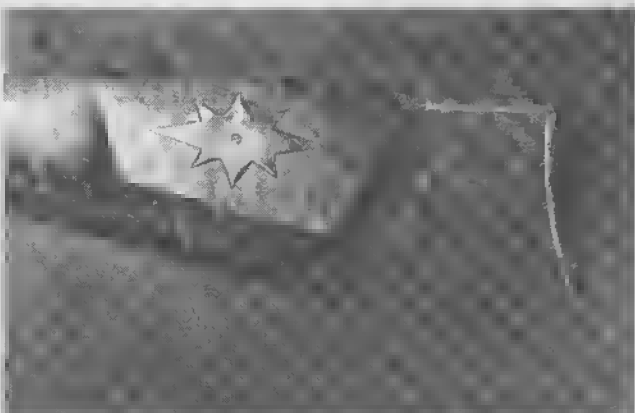
A common practice in Colonial days, Emmanuel named Pennsylvania-type flintlock after his wife and daughter.



Brass patchbox required many hours of careful work to inlay. Iron screws retain it in stock as in originals.



Patchbox lid is opened by pressing a button at the toe of the stock. Recess is for extra flints, greased patches.



Historically typical squared-off cheekpiece has hex star inlaid in its surface. Brass butt plate is circa 1795.

At the time of this writing, Emmanuel was in the process of building a flintlock rifle based on the design of the type produced in York County, Pennsylvania. This rifle sports a Douglass XX grade barrel forty-two inches in length, is

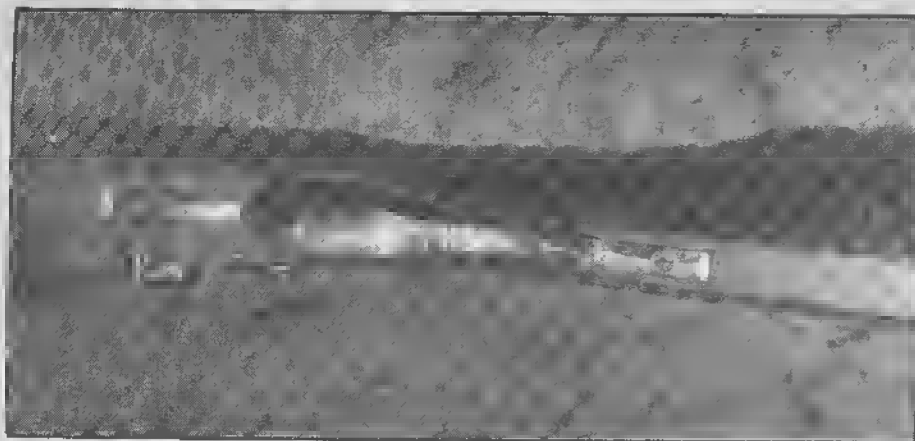
.50 caliber and has an eight-groove barrel. The stock is of premium grade curly maple and the patch box is in the styling of George Eister of York County, circa 1795.

When the rifle was finished, the barrel was inscribed with Emmanuel's name — his first attempt at engraving — and the lock retaining plate bears the name *Annie Elaine*. The Annie refers to his young daughter, while Elaine is his wife. Hence, the name of this graceful flintlock rifle is Annie Elaine.

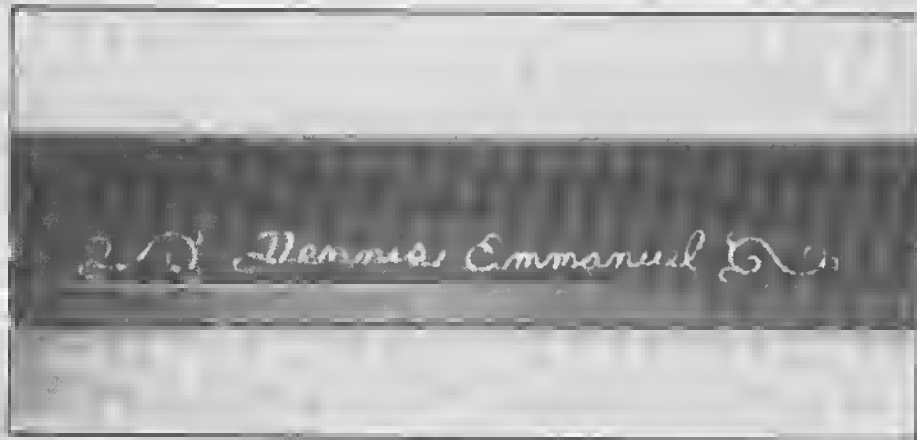
Emmanuel made the front sight from solid silver and hand-cut all inlays. The finished rifle is a piece anyone would be proud to own.

The predictions are that Dennis Emmanuel soon will become well known and in considerable demand by those wanting antique arms restored. Such restoring measures comprise a highly technical phase of gunsmithing, thus there is great demand for craftsmen skilled in this art. Consequently, the pay for a highly skilled craftsman in this field is considerably higher than is the going rate for conventional gunsmithing.

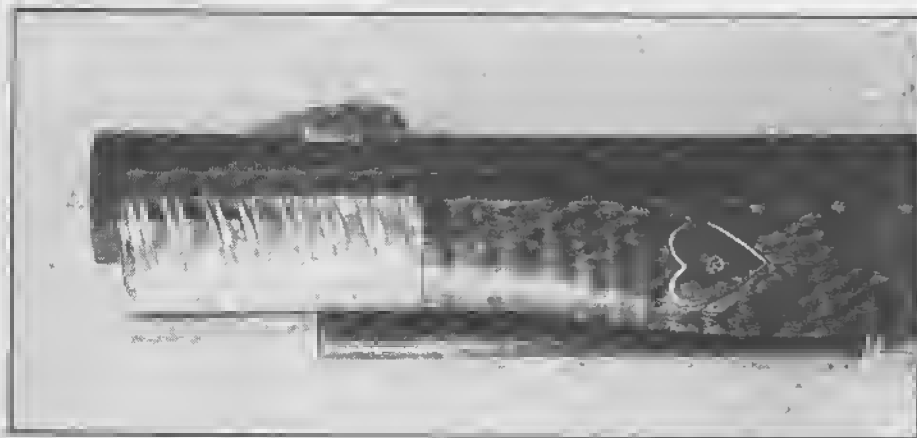
Another craftsman I have known for some years is Frank Rossclot, also of California. His shop is located in a modest building located to the rear of his garage and, when



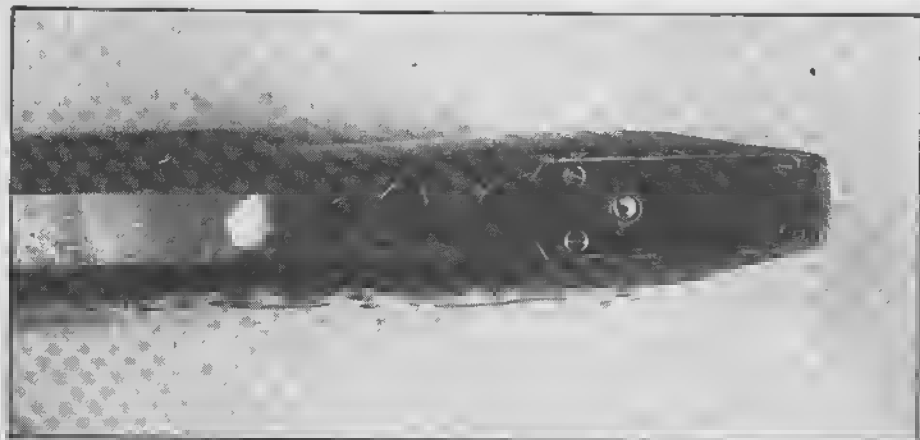
Precisely inlaid trigger guard is of brass, gracefully contoured to the trigger bow and finials.



In his first attempt to engrave barrel, Dennis Emmanuel emulated the style of the late 1700s and inlaid cut with 10-karat gold.



Graceful, unique configuration of this forend cap was Emmanuel's own idea. It required careful file work. Front sight is of silver, while the inlays are of brass.



Toe plate in the stock contains the push button that actuates the lid of the patchbox. Both lid and button are spring-loaded.

Frank Rosselot has tons of older gun parts that he uses in restoration work. He inspects one of his old barrels with an eye to future use.



one enters the shop, the first impression is: "Gosh! Look at all the gun parts!"

Frank Rosselot more or less specializes in refurbishing older Marlin's, Winchesters, Sharps and any other rifle to which he might take a fancy. He has been a serious hobbyist for many years, as the literally tons of gun parts in his shop will attest. He has a love for big-bore rifles.

Rosselot's equipment includes a somewhat aged lathe, drill press and other machine tools, but he still does most of his work by hand. I have examined several rifles he had rebuilt recently and they were pure jewels. One was a rare 1886 Winchester saddle ring carbine which demands a fat price on the collector market. Another rifle was an old lever-action Marlin Model 1895 in .40-65 caliber. The 1886 Winchester carbine was a special project in that he

always had wanted such a carbine in .45-70 caliber for his own use. The rarity of this model prompted Rosselot to build his own from old parts laying around his shop.

Frank Rosselot insists that most used tools are his assortment of what he refers to as his Mexican milling machines: hand files. His trusty old lathe still is capable of precision work in spite of its stature as a collector item in its own right.

He has traveled to Wyoming each season to bag deer and pronghorn antelope. When the serious hunting is over, Frank Rosselot then goes to a secret spot in the Wyoming hinterlands and snipes ground squirrels by the hundreds. Each rifle he uses is of his own concoction. He has rebuilt, restored, rebarreled and refurbished every rifle he uses on his hunts. Surprisingly, he favors the older lever-action



Harold Ball, an astute gun hobblist, rebuilt, restored this old Sharps buffalo rifle he found in a chicken coop. He made the Bowie as well. Renowned in ranks of collectors, he appreciates need of restoration.

Marlins or Winchesters for these jaunts, all in hefty calibers ranging from .45-70 to .50 caliber. On occasion, he will use a bolt-action.

Frank Rosselot does do some work for friends but basically he considers himself a hobbyist. When a good gun show is in progress anywhere in his area, he will be there, looking for old parts for his beloved, aged Marlins and Winchesters.

Yet another hobby-oriented craftsman I have known for many years is Harold Ball, a Californian like the others. His love is repairing, restoring and refurbishing any item, be it an old Bowie knife, a pair of cowboy spurs or rifles and pistols, related to the winning of the American West.

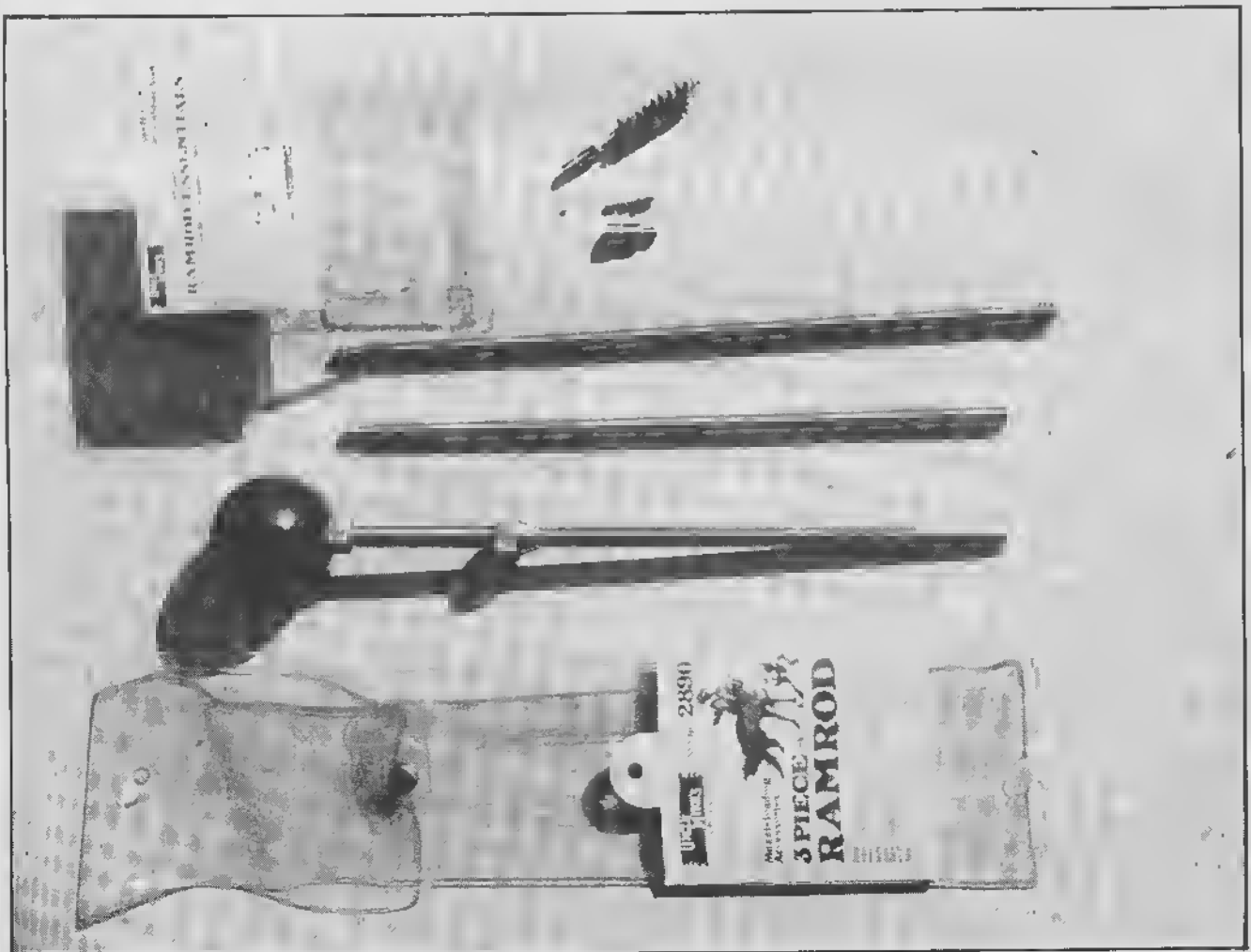
The latest of his restorations is an old Sharps buffalo

rifle which he terms his "chicken coop" Sharps. Ball found the stock and action of this rifle in the rafters of a farmer's chicken coop. What was left of this old rifle was in need of a barrel, a forearm, sights and other internal parts.

After scrounging for months, Ball was able to locate all the parts needed to put this historic old rifle into operating condition. Ball's purpose in restoring this Sharps was to turn it into a presentable wall decorator. Since it was still in relatively poor shape, even after restoration, he decorated it with Indian-type brass tacks. The majority of firearms used by American Indians are in sad shape when found today, hence the application of the brass tacks added greatly to the eye appeal of this crusty old rifle.

Had it not been for Harold Ball literally saving this fine old rifle even for a decorator, it would have ended up in the

Michaels of Oregon produces an excellent line of rods to clean and load cartridge and muzzleloading rifles and pistols. This rifle rod is completed with a muzzle protector and the essentials required for cleaning bore properly.





Harold Ball displays the .22 Mannlicher-style Mauser rifle, which he rescued from a trash heap. Starting with nothing but the barreled action, he was able to restore it to fully operational condition, now shoots with it.



Ball capped the pistol grip of the reclaimed Mauser with stag horn to give it a custom look.



Ball added ramp to the cropped barrel plus a buffalo horn schnabel to give the .22 Mauser Oberndorf a custom look.

junk heap, lost forever to collectors of the future. Today this rifle hangs over the fireplace in Ball's den, a rugged and showy decorator item.

Another desirable arm salvaged recently by Ball is an Oberndorf Mauser .22 single-shot rifle which he rescued from a neighbor's trash bin. The barrel had been cut to nineteen inches, it had no stock or trigger guard, but the action and barrel were in better than average condition.

Bell proceeded to restock it in the Mannlicher style, capping the pistol grip with the butt of a stag horn and forming the Schnabel from buffalo horn. Now in typical European styling, this rifle once again is in serviceable condition.

The new gun hobbyist should begin with the most simple projects, then as his knowledge progresses, proceed to the more technical facets of gun work. Perhaps the best approach for the beginner would be to limit his work to nothing but cleaning firearms. It is surprising how much gun savvy can be attained by partially dismantling a firearm and giving it a thorough cleaning. It lets one know quickly just how intricate are the mechanisms of some guns. On more occasions than I will admit, I have had amateurs come to me with guns they had managed to dismantle but couldn't get back together. This is an excellent way for one to learn his own limitations, while gaining knowledge.

The tools and equipment needed for thorough cleaning

of rifles, pistols and shotguns are minimal and consist of nothing more than a good set of cleaning rods, patches, brushes, solvents, oils and perhaps a paint brush for washing major components in solvent. However, one must use common sense in his cleaning methods. Don't attempt to clean a .30 caliber rifle bore with a .22 rod, or a shotgun with a rifle rod.

Michaels of Oregon produces a complete line of cleaning rods designed specifically for muzzleloading rifles, pistols and shotguns. In addition to the cleaning rods, Michaels has thoughtfully considered the possible wear on the muzzle end of the gun's bore and has introduced a self-centering muzzle guard. This solid brass guard centers the loading or cleaning rods in the bore. It eliminates friction from these rods at the end of the bore that could lead to a malformed muzzle. These muzzle guards will fit any bore size from .36 to .62 caliber.

Another way for the amateur to further his knowledge would be to refinish a gunstock or two. The complete procedure for this operation may be found elsewhere in this book.

Far too many people want to start at the top in any trade, but where firearms are concerned, the basics must be learned first, otherwise one could be in for a lot of headaches from possible clients or disgruntled friends.



Invaluable for protection against undue wear at muzzle is the bore/muzzle protector from Michaels of Oregon. It works equally well with either cartridge or muzzleloaded guns. (Below) Like other gunsmiths, Bish is a believer in hoarding old gun parts for use in his future projects.





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